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## CONTENTS

	PAGE
Editorial Notes . . . . .	197
A Development Policy for British Railways . . . . .	199
Tasmanian Government Railways . . . . .	200
The U.S.A. Railway Situation . . . . .	200
Indian Railways and Road Transport . . . . .	201
Western German Transport Problems . . . . .	201
Letters to the Editor . . . . .	202
The Scrap Heap . . . . .	203
Overseas Railway Affairs . . . . .	204
A Paradox of Modern Railway Management—I . . . . .	206
Rolling Stock for Pakistan Railways . . . . .	208
Victorian Railways "J" Class Locomotives . . . . .	211
New Method of Pointing Brick-Lined Tunnels . . . . .	213
Personal . . . . .	215
News Articles . . . . .	218
Contracts and Tenders . . . . .	221

## The Railway Wages Dispute

THE deadlock over railway wages is far from being hopeless, and there is still a long way to go before any possible strike action, despite talk of this among a few hot-heads. The meeting last Friday between the British Transport Commission and the three railway unions, the National Union of Railwaymen, the Associated Society of Locomotive Engineers & Firemen, and the Transport Salaried Staffs' Association, failed to achieve any agreement; and there is a considerable gap between the Commission's proposal for a new wage structure reckoned to cost an additional £6,000,000 a year, and that of the N.U.R., which might cost an additional £18,000,000. The other two unions, which include a higher proportion of skilled men, have refused the Commission offer on the grounds of insufficient differentials. Although the A.S.L.E.F. members are embittered by the low wages paid to engine-men today, compared to those in less exacting occupations, the executive of that union has shown moderation in asking that the dispute be referred to the Railway Staff National Council, the next stage in the prescribed negotiation procedure. The N.U.R. and the T.S.S.A., the executives of

which were to meet later this week, are likely to do the same. It is hard to see what more the Commission can do. The wage increases agreed at the beginning of this year are costing £12,500,000 a year, and the Commission cannot find the money for further increases without raising charges, which would have deplorable effects in the light of the increased competition faced by British Railways since the passage of the Transport Act of 1953. It is not yet known how much can be realised by increased efficiency, the subject of talks between the Commission and the unions. The present situation is partly the result of the N.U.R. using the agreement to revise the wages structure as a means to increase the wages of the lower paid grades, and hence the difficulty in fixing differentials. There is still hope of achieving some agreement when the matter is referred to the Railway Staff National Council, but this seems likely to involve considerable concessions on the part of the unions.

## Railway Management and Operating Statistics

ORTHODOX railway economists are likely to have some of their notions disturbed by the article on railway management by Mr. A. R. G. Saunders, Acting General Manager of the Sierra Leone Railway, the first part of which appears on another page of this issue. The article sets out to show that many of the statistics carefully compiled by railways to enable managements to watch the efficiency of their undertakings are liable to be a brake on commercial enterprise and may even, if too rigidly used as a basis for budgetary control, inhibit expansion of railway services. Mr. Saunders maintains that a railway operating at high efficiency, by orthodox standards, may earn less revenue than one operating at much lower efficiency. Some of the examples given are perhaps oversimplified—the single daily train increased to two trains a day will bear the interpretation given only if a second train and locomotive are already available—but the views expressed are a salutary reminder that operating statistics are a tool of management and not an end in themselves. Departmental budgets are often based with too much emphasis on previous years, and the article may well serve to point the need for technical department budgets to be drawn up with an eye on commercial department traffic forecasts.

## British Equipment for Brazilian Railways

A PLAN for the re-equipment of two southern Brazilian railways, the Parana-Santa Catarina and the Rio Grande do Sul, with British equipment is reported to have been drawn up and the National Bank for Economic Development of Brazil is understood to have agreed in principle to underwrite the plan over 10 years. The supplies from Britain would be financed by the proceeds of exports, including timber, to Britain from the regions served by the railways concerned. These exports could not be made without the increased railway facilities which British industry might undertake to build. The value of the preliminary order would be some £7,600,000, and it would include the supply of over 90,000 tons of rails, 35 diesel locomotives, and quarry equipment. The enthusiasm of Sir George Nelson, Chairman & Managing Director of the English Electric Co. Ltd., whose tour of Latin America was mentioned editorially in our issue of July 30, for what he has termed "perhaps Britain's largest potential market," has renewed interest in Anglo-Brazilian trade, and he has said that Brazil is in urgent need of better transport, and especially of railway re-equipment. Further details of the plan will be awaited with interest, for there can be little doubt that once British apparatus is installed, repeat orders will follow.

## Autumn Fares in the Western Region

A MOVE to extend the holiday season in the West Country will be given added impetus by reduced fares recently announced by the Western Region of British Railways. The fares are to be introduced from

London and Birmingham and will be available for the outward journey on the Saturday of issue and for return on the following Saturday or the Saturday after that. This eight- or 15-day availability is reminiscent of the tickets for the popular "Starlight Special" services, and it is to be hoped that the new facilities will be equally well received by the public. From Paddington tickets will be available to 36 destinations and from Birmingham to 34 holiday resorts. The fares compare favourably with those offered by road coach services. The journey from Paddington to Penzance will cost 66s. 6d. return, and from Birmingham to Penzance 65s. The tickets will be available by specified trains in each direction, third class only, and no break of journey is permitted. As envisaged at present the fares will come into operation in October, but, no doubt, if the experiment is as successful as it deserves to be, consideration may be given to a wider extension of these facilities.

### Overseas Railway Traffic

**M**IDLAND Railway of Western Australia railway and road service receipts for May were £67,188, compared with £58,044 for May of last year. The aggregate for the 11 months from July 1 is £667,677, against £606,876 for the corresponding period of 1952-53. Costa Rica Railway traffic for May were colones 1,582,209, compared with 1,692,194 last year. In June they rose to colones 1,633,794, against 1,573,943 in June of last year. Aggregate receipts from July 1 to June 30 amounted to colones 18,130,775, an increase of colones 386,097 over the aggregate of colones 17,744,678 for the corresponding period of the previous year. During May and June the official exchange rate remained constant at colones 15.87 to the £, and the free rate at approximately colones 18.62 to the £. Paraguay Central Railway receipts were G1,223,028 for the week ended July 9 and G1,366,709 for the week ended August 6. In the week ended July 30 they reached G1,458,915, an increase of G477,562 over the corresponding week of 1953-54. The aggregate from July 1 to August 6 was G7,010,771, an increase of G1,712,434 over the figure of G5,298,337 for the similar period of the previous year.

### Catering for all Tastes

**T**HE trend in British railway catering towards satisfying more popular tastes, exemplified in the service of light refreshments in cafeteria cars as opposed to set meals in restaurant cars, is mentioned by "The Man on The Line" in the August issue of the *British Railways Magazine*. He points out, however, that there is still a big demand in many trains for a full restaurant-type meal and that the policy of the British Transport Commission Hotels & Catering services is to cater for all tastes and all pockets both in trains and at stations. This has resulted in the new combined cafeteria-restaurant car described in our issue of July 16. How far a really satisfactory set meal can be served in the restaurant section of these cars whilst the necessary limited resources of the car are being drawn on to serve refreshments in the cafeteria section, only time can show. It has been done and is being done successfully in some refreshment cars on the Continent. At all events the new cars are a courageous experiment.

### Essential Amenities of Travel

**W**HAT is not clear is whether the policy of accommodating all tastes and all pockets takes into account the fact that satisfactory refreshment services, and more especially restaurant meals of a kind to suit business men and others willing to pay a fair price for a good meal, are an integral part of railway passenger service, whether the service itself is profitable or not. Without this amenity many potential passengers would take to other forms of transport. This applies to railway hotels as well, especially at packet ports and important junctions, where travellers look for accommodation when they are stranded or delayed by missed connections or bad weather. A regrettable tendency since nationalisation of the railways has been

the closing of hotels at packet ports and elsewhere on the ground that they did not pay—which is false economy. The hotels are not, unfortunately, to be returned to railway management. With train and station catering, it is good news that no time has been lost in implementing the recommendation in the White Paper on railway reorganisation that Hotels & Catering Services officers be attached to the staffs of Chief Regional Managers to maintain liaison in the provision of catering facilities.

### Rail Clamp for Concrete Sleepers

**A** NEW fastening for securing flat-bottom rails to concrete sleepers has been designed by British Railways. It is hoped that this will make for smoother running, prolong the life of the sleepers, and assist in checking rail creep. The fastening consists essentially of two steel clamps which are fastened down to the sleepers by galvanised steel coachscrews driven into corrugated wooden plugs cast in the sleepers. The clamps grip the foot of the rail on each side. Rubber pads are provided at all points where the clamps bear on the sleepers, and a rubber washer is inserted between the coachscrew washers and the clamps. A rubber pad is inserted between the rail and the sleeper. The rubber also acts as an insulating medium and should do much to improve the electrical characteristics of the assembly and eliminate the difficulties which have sometimes presented themselves when track circuits have been installed on stretches of track employing concrete sleepers. The new fastenings are to be installed experimentally in the autumn on a selected length of track, and if this proves successful it may enable the use of concrete sleepers in main lines to be greatly extended.

### Pointing Brick-Lined Tunnels

**A**N improved method of pointing brick-lined tunnels evolved by the Western Region of British Railways and based on the Aerocem process of producing aerated mortar, is described in an article the first part of which appears on another page of this issue. Demonstrated by Mr. M. G. R. Smith, Civil Engineer, Western Region, at the conversazione held by the Institution of Civil Engineers last June, this method promises to obviate many of the difficulties of obtaining manpower and arranging track occupations which beset the railway civil engineer today. The process of cleaning brickwork by high-pressure water jets, followed by pointing the cleaned joints with a gun delivering foamed grout under pressure, is rapid, and the equipment, with its supplies of materials, can all be mounted on a short special train, which gives it exceptional mobility. Staff requirements are comparatively small, and some of the operators can be trained rapidly in the use of the process for a particular job. A great deal of research was undertaken in the development of the method, and there can be little doubt that other applications of the process to civil engineering problems will suggest themselves as experience is gained.

### Passenger Stock for Pakistan

**E**LSEWHERE in this issue is described and illustrated the new passenger stock built by a French group of rolling stock manufacturers for the Pakistan Railways. The order comprised a total of 235 carriages, 122 for the broad-gauge North Western Railway, and 113 for the metre-gauge system of the Eastern Bengal Railway; the former includes air-conditioned restaurant cars and sleeping cars. All carriages are of integral design, particular attention being given to the problem of weight. In general design, the bodies are somewhat similar in construction, which takes the form of a box-type framework, principally welded, and reinforced by U-shape intermediate side and end pillars. All carriages were subjected to combined strain-gauge testing of the body shell, by means of horizontal and vertical loads applied simultaneously. For the broad-gauge carriages the horizontal compression applied to the buffers was 200 tons, while a vertical load of 38 tons was divided over the entire

structure. The metre-gauge stock was subjected to a horizontal load of 150 tons applied to the drawgear casing, its vertical load being 36.8 tons. The air-conditioning equipment was supplied by J. Stone & Co. (Deptford) Ltd.

### Irregular Operation of Points

**A**LTHOUGH there was some conflict of evidence regarding the circumstances of the accident at Bethnal Green on September 4, 1953, it was clear that operating power somehow had irregularly reached the motor of a pair of electrically-worked facing points and caused them to be reversed between the bogies of the leading coach of an express, fortunately travelling at only 20 m.p.h., because of the steep gradient. The coach was destroyed but, again fortunately, little harm befell its four occupants. As will be seen from our summary in this issue of Brigadier C. A. Langley's report, it was not absolutely certain how the false feed came to be applied to the circuit, although there was a strong probability in favour of one of two possibilities. Ever since there was any electrical signalling, especially power signalling, the risk of some irregularity arising from false contacts, however originating, has been recognised, and much attention bestowed on making circuits as proof against them as possible. In spite of the ingenuity that has been expended on this problem the chief guarantee of security must always reside in perfectly maintained insulation and contacts and taking constant care, when making any examination, not to establish inadvertently any irregular connection to some wire or terminal. As the report, while making recommendations for certain improvements, emphasises, very little trouble has been experienced with our installations, a tribute to their good design and the manner in which they have been maintained.

### Vulcan 2-8-0 Locomotives for Victorian Railways

**I**N course of construction at the works of the Vulcan Foundry Limited are 60 "J" class locomotives for supply to the Victorian Government Railways. The locomotives, which are described and illustrated elsewhere in this issue, are of the 2-8-0 type, and a feature of their design, in common with other modern locomotives ordered by the railway is, that although built for 5 ft. 3 in. gauge, they are easily converted to operate on the standard gauge. The possible conversion of the Australian railways to standard gauge has been mooted for some time, and was discussed in our March 17, 1950, issue. The locomotives, which are required to negotiate a minimum curve of 462 ft., have a maximum axleload of 14½ tons, and a tractive effort of 28,650 lb. at 85 per cent boiler pressure. Thirty of the engines are designed for coal burning, and the other thirty for oil burning. A Hulsol pattern firegrate is fitted to the coal-fired engines, and for the oil-burning engines a shallow flame pan is provided with a single oil burner at the front end. Air is supplied through a damper in the bottom of the pan, and also through short tubes through the brick linings.

### Out and Back in a Day

**T**WO folders have been produced by the British Transport Commission for the guidance of businessmen with appointments to keep, involving travel between London and the provinces; they are being distributed at stations and at British Railways offices and agencies. The folder for the London businessman is inscribed on the cover "Time for your Meeting in the Provinces—Back in a Day," and that for his provincial colleague is correspondingly entitled. The coloured covers with their briefcase-and-umbrella motif are gay and attractive. The letterpress draws attention to the possibilities of comfortable return journeys in one day between London and the provinces, and to seat reservation and refreshment facilities in trains and to sleeping cars for longer journeys—and, not least, to the fact that "any necessary reading or writing can be done in comfort" on the way to or from an appointment. Details are given of trains which enable the return journey to be

completed comfortably in one day from London to stations in some 17 provincial cities, and vice versa. Services are shown by several routes. It is largely in this kind of travel that British Railways have much to offer, and the new folders should be of considerable help in selling this kind of transport.

### A Development Policy for British Railways

**A** PLAN for the improvement of British Railways, largely in the matter of propulsion, is outlined by Mr. Neil W. Gardiner, a member of the Ridley Committee on fuel and power policy, in a paper submitted to the Minister of Transport & Civil Aviation, the Minister of Fuel & Power, the British Transport Commission, and, it is understood, some Members of Parliament. The author begins with the remark that the railways, as an industry, appear to suffer more than most from "a resistive stupor born of circumstances rather than individual lack of enterprise." He questions whether any really notable and radical progress, capable of slashing costs, has been made in the last 40 years. The answer to railway problems, he thinks, lies in the reduction of operating costs, entailing the abolition of out-of-date restrictive practices and an overhaul of railway legislation.

No sound and profitable scheme of reconstruction embracing re-organisation and re-equipment has yet been forthcoming, Mr. Gardiner says, and he points out that capital can always be found to finance a sound and profitable scheme of reconstruction. As the railways themselves have not produced a scheme, he urges that it would be logical for the responsible Minister to look outside the industry for advice. An appropriate team to produce a new type of train, he considers, might be a designer each from the aircraft, motorcar, and heavy lorry industries, with a fuel technologist and an economist, with a railway engineer attached in an advisory capacity.

Drawing on his experience with the Ridley Committee, Mr. Gardiner examines in some detail the relative fuel efficiencies of various forms of railway motive power, concluding that with steam locomotives this is some 2.5 per cent, as much as 18 per cent with electrification, and over 20 per cent with diesels. He suggests that the weight of coaches is unnecessarily high in Britain, giving a ratio of tare to pay load of some 25:1, compared with some 7:1 for road transport. He thinks that possibly too much attention is paid to the safety factor and, while recognising the high degree of safety on the railways at present, advises that this factor should be kept in its proper perspective.

All areas of high traffic density should be electrified; with all principal main line stations; and all new passenger stock should be of light construction and self-propelled by electric motors. For low or medium traffic density areas mobile electric generators should be used to supply power to the train motors, such generators to be capable of self propulsion, but not regarded as traction units, and to use, for the time being, diesel engines to drive the generators. Experience in Europe suggests that the possibility of changing British electrified lines to an a.c. system should be re-examined, and on the electrified lines locomotives should be used for goods, but multiple-unit stock for passenger trains. Steam locomotives would be relegated by Mr. Gardiner to work in country areas until an economic replacement becomes available.

Such a scheme, he considers, would enhance flexibility in operation. Advocating smaller, more frequent trains, he sees a possible reduction in the staff of main line stations, which would have their work spread more evenly over the day. Fuel efficiency might rise to 18 per cent or more on country runs and to 25 per cent in electrified areas, and as the power stations can use smaller coal, large coal would be released for domestic uses and export. Capital expenditure would be on a reasonable scale compared with total electrification, and the changeover could start at once, as the mobile generators could be used pending electrification.

Rolling stock availability, he maintains, would thus be improved, and the lightening of individual wheel loading by the spreading of traction motors along the train instead of



concentrating adhesion weight in a locomotive should lessen track maintenance. Branch lines might be saved by using buses and lorries of more or less conventional type fitted with flanged wheels. He considers that freight traffic has probably been lost because the road transport system has developed whilst railways have stagnated.

The paper contains a number of other suggestions of a minor nature, but the mobile generating units are perhaps the most interesting feature of the paper. The fact that most of the ideas presented are already current in railway circles, under trial, or in practical operation, seems to show that perhaps the railways are not as moribund as Mr. Gardiner appears to think. The great difficulty is now, as always, finance, and this paper may at least help to emphasise the need for capital expenditure on the railways.

### Tasmanian Government Railways

THE report of the Tasmanian Transport Commission for the year ended June 30, 1953, a copy of which we have received from Mr. C. E. Baird, Commissioner, again shows an overall loss on working, namely £738,025, an increase of £5,123 over the previous year's deficit. Actually, railway revenue was £241,867 higher than in 1951-52, but expenditure rose by £283,843, due to increased costs of labour and material beyond the control of the Commission.

Of this increase of £283,843, £236,000—no less than 83 per cent—represented enhanced wages and salaries, the average rise in wages during the year being 7 per cent; cost-of-living adjustments in the basic wage were mainly responsible and totalled £221,000. Since 1938-39 the average wage-increase had been 210 per cent, and the 40-hour week, increased overtime necessitated by shortage of staff, and penalty rates for overtime and week-end work all added to the total labour costs. The corresponding rise in the cost of materials was 300 per cent, or £300,000.

During 1952-53 interest charges increased by £25,606, and during the eight years ended June 30, 1953 average interest and depreciation charges rose by £71,617 a year as a result of the great increase in railway capital from £2,070,060 in 1938-39 to £7,029,974 in 1952-53. This increase in capital was caused by the far-reaching programme of improvements implementing the recommendations of the Chapman and Parliamentary Joint Select Committees. The investment of this sum of nearly £5,000,000 had been amply justified. Over £2,000,000 had been spent on 56 new locomotives since 1947, so that over half the locomotive stock had been replaced in six years.

The following figures in the report show that the railways were not losing traffic rapidly or becoming obsolete in any respect, despite the increasing annual losses:—

PERCENTAGE INCREASES OF 1952-53 OVER 1938-39	
Net ton-miles of goods carried ... ..	Increase, per cent
Average load per train-mile ... ..	120
Average density of goods traffic per route-mile (net ton-miles) ... ..	109
Revenue per train-mile ... ..	136
Average capacity of wagons ... ..	305
	143

### SOME OF THE PRINCIPAL RESULTS OF WORKING

	1951-52	1952-53
	(Thousands)	
Passenger journeys ... ..	3,187	3,151
Passenger train-miles ... ..	895	864
Goods & mineral tonnage ... ..	889	897
Goods ton-miles ... ..	88,696	83,689
	(£ thousands)	
Passenger revenue ... ..	177	173
Goods ... ..	1,539	1,777
Total operating revenue ... ..	1,808	2,049
Working expenses ... ..	2,389	2,673
Loss on working ... ..	582	624
Interest & depreciation ... ..	381	419

As from November 16, 1952, there were increases in fares and freight charges, but they were not sufficient to offset increased costs. Since 1938-39 fares had been increased by only 30 and freight charges by 150 per cent, as the Government wished to develop and encourage industry, but costs of salaries, wages, payroll tax, and super-annuation had risen by 330 per cent. The report quotes various opinions agreeing that the industry of the State could not afford to allow the closing down of the railways,

as was sometimes suggested because of the annual losses incurred.

During the year the new station at Hobart was completed and was considered the most modern in Australia. A new diesel servicing and repair workshop was also opened by the Governor of Tasmania. Standard 82-lb. rails were being laid on all main lines. Eleven diesel-electric and two "M" class steam locomotives, six articulated railcars, and 107 goods vehicles were placed in service. This new stock and extensive track, station, and marshalling yard improvements had eliminated uneconomic maintenance of obsolete stock, increased train-loads, and expedited the turn-round of wagons.

The road services operated by the Commission made a net profit of £34,047 during the year, £16,301 higher than in 1951-52. In supporting the co-ordination of transport and regulation of road transport, the report stresses the benefit of the latter in protecting licensed operators from cut-throat competition. A Select Committee of both Houses of Parliament decided to obtain the services of Mr. H. H. Phillips, Chief Commercial Officer, British Transport Commission, to investigate and advise on rail and road passenger services in the State.

The number of derailments was nine as against 68 in the previous year, four only being serious and due to excessive speeds. Practically all road locomotives, however, were being fitted with speed recorders. It is remarkable that no passenger has been killed on the Tasmanian Government Railways since 1916.

### The U.S.A. Railway Situation

A LETTER published in our August 13 issue on the subject of U.S.A. passenger train accelerations, referred to the steep decline of railway earnings in the first five months of this year. On July 21 the Association of American Railroads issued a bulletin which showed that a recession in freight traffic had not been checked—a serious matter as freight brings in 10½ times the amount of revenue received from passengers.

During 28 weeks to July 10 wagon loadings numbered 17,549,200 against 20,318,460 last year, a decrease of 13·6 per cent. About 8,000 more wagons were loaded with grain, but forwardings of other commodities were down badly. During the period 42 million tons less of bituminous coal were produced, a decrease of 18 per cent, and 483,800 fewer wagons were loaded (14·6 per cent). The steel industry worked unevenly at 60 to 75 per cent of capacity with the result that ore carryings decreased by 486,900 wagons (32·6 per cent) and the movement of coke dropped, by 170,365 wagons (42·5 per cent). Decreases of 10 to 12 per cent took place in the loadings of "small" and, general merchandise, both highly rated traffics. Recently the railways have recorded a daily surplus of 100,000 wagons and therefore allowed repairs to accumulate until 120,000 wagons were out of action at June 30, representing 6·5 per cent of ownership. Only 12,400 new wagons were then on order, about a quarter of the number at the same date in 1953.

Fortunately for the U.S.A. railways, the shift from steam to diesel motive power is nearly complete and is yielding much-needed economies. The A.A.R. bulletin gives up-to-date particulars of the changeover. At the beginning of 1934 the U.S.A. railways owned 50,000 steam locomotives; in August, 1954, they own 10,000. In 1934 the railways had 97 diesel units and tried the new motive power for the first time in main line working; they now own 16,860 complete diesel locomotives, as operated. The number of electric locomotives is just over 600 and is not likely to increase.

Nearly two-thirds of the diesels now in service were installed after 1948 and during the last 5½ years some 22,550 steam locomotives were withdrawn. The average tractive effort of the diesel as operated is nearly 40 per cent greater than the effort of the steam locomotive, and about 25 per cent above that of the electric locomotive. The diesel has another advantage in its low "under-repair



percentage" of 3.5 at June 30, compared with 11 per cent for both steam and electric locomotives. To a great extent these factors explain the rise to record heights of the statistics which measure operating performance. Last year the average freight train hauled a net load of 1,301 short tons at 18.2 m.p.h. between terminals and produced 23,443 ton-miles an hour. That was an improvement of 25 per cent on the 1948 output.

A further advance in operating results cannot be looked for this year. When traffic volume contracts, statistics derived from ton-miles tend to turn downward, while train speeds may be higher because loads lighten and tracks are less occupied. A significant statistic of wagon user, net ton-miles per serviceable wagon per day, already shows a downward trend. In every month of 1953, save December, the statistic was above 900 and in four months was over 1,000; the highest figure reported this year was 876 in May against 1,003 in May, 1953, a difference of 12.6 per cent.

The Association of American Railroads circulates this statistic periodically to the Shippers Advisory Boards, which co-operate in adjusting railway practices for the supply of wagons and the movement of freight, in normal times as well as in emergency. These boards are entering their fourth decade of service and the A.A.R. is anxious that they should continue their assistance in full vigour. The outlook for the railways will be bleak if there are no wagon shortages in the fall of the year, the season for heavy loadings.

### Indian Railways and Road Transport

**R**OAD competition with the railways was causing many misgivings when the Government of India adopted some years ago the policy of authorising the railways to invest capital in road transport undertakings and to take an active part in their management. The reasons for this policy seem to have been a desire to develop road feeder services to the railways and therefore to encourage economic development of rural areas; and to ensure by means of control of the road transport undertaking, some degree of co-ordination of railway and road services and to eliminate road competition. The extent to which road services were developed by the railways has differed greatly in India. An extreme example in the road services of the former Nizam's State (now part of the Central) Railway, which did much, between the wars, to develop rural areas in the State of Hyderabad.

Since partition in 1947, some of the undertakings in which the Indian Government Railways have invested have not provided any appreciable return on capital. Road transport is controlled to a great extent by State (provincial) Governments as opposed to the Central Government, though the latter participated to some extent. The amount invested by the railways is relatively large. It is treated as capital expenditure and shown in the railway accounts as an asset. In the Bombay State Road Transport Corporation, for instance, the total investment of the railways in 1951-52 was some £1,900,000, on which a dividend was paid of 3 per cent. In some States the road undertaking recently has paid no dividend. The railways, however, must pay to the Central Government general revenues an amount equal to 4 per cent on the total capital invested irrespective of the dividend paid by the road undertaking. Drawing attention to this, the Indian journal *Railway Accountant* in its July issue questions the desirability of the present arrangement.

With State or Central Government control of road transport, it is pointed out, there is now little likelihood of measures being taken by road undertakings which would be detrimental to the State Railways. If the Central Government wishes, for purposes such as the economic development of backward districts, to develop road transport, it should do so directly as a Central Government road undertaking, and not saddle the railways with responsibilities extraneous to their proper functions. Considerable development of the roads is taking place under the Five-Year Plan, and doubtless will continue thereafter. Presumably, the Central and State Governments will increase their participation in road transport; if so, this would be an opportunity of putting the railways on a proper footing in this respect.

### Western German Transport Problems

**A**N account of the problems facing the railways of Western Germany and of the way in which they are being tackled has been given recently by Dr. Hans Seebohm, Federal Minister of Transport; he was addressing the German Engineers' Association at Essen. The division of Germany into two States, with the consequent partitioning of the resources of the former German State Railway, has added to the difficulties of the devastation caused by the war. There is a vocal section of fairly influential public opinion which urges large-scale abandonment of the railways in favour of road transport. The absurdity of this as a general policy is demonstrated by Dr. Seebohm. It demands construction of more *autobahnen* without realising what that would involve financially and otherwise. He emphasised that it was essential that railway engineers should have a progressive outlook and explore every new way of adapting rail transport to changed circumstances.

The German Federal Railway authorities have made extraordinary efforts to repair the heavy war damage to their lines in which they received in the earlier postwar years, very considerable help from the occupational authorities in the three western zones. Apart from actual damage, there were heavy arrears of maintenance and renewals. Resources have been limited, and although a comprehensive plan was drawn up in 1951 intended to be completed in 10 years, progress has been much less than was hoped for.

It was estimated at the beginning of the present year that to make good the remaining war damage and bring maintenance up to date would cost about DM. 860,000,000 a year for five years. It will not be easy to find this sum and prices do not tend to fall. The Minister submitted to the government a scheme covering financial and other measures designed to facilitate this. A considerable programme of rationalisation has been put into operation; and although this has necessitated extensive staff changes, with all the attendant difficulties and misgivings, good feeling is stated to have been maintained and reforms carried through which already have had a noticeable effect. These have included re-organising the operating, engineering and other departments, and reducing the number of repair depots, sheds, stores, shunting yards and so on.

The process is still being pressed forward, and by 1956 an annual saving is expected of some DM. 180,000,000. Concurrently with these negative measures, as Dr. Seebohm describes them, have gone others, involving certain capital works, intended both to increase traffic and to lower working expenses. These include electrification, now being carried out on 680 miles of route, mechanisation of freight handling, improved shunting yard equipment, extension of power and automatic signalling—with considerable reduction in the number of signalboxes—extended application of diesel traction, and special vehicles for facilitating rail-road interchange, increase in container working and so on.

Dr. Seebohm stressed the fact that, despite the difficult times and in contrast to what had occurred in some other countries the German railways had been for a long time exceptionally free from industrial disputes, and although the actual value of such a circumstance was very difficult to assess it had obviously been of immense economic value to all sections of the community. The Government of the Federal Republic, he stated, is alive to the necessity of getting the best out of all forms of transport in the national interest and has laid proposals before the legislature for a comprehensive plan, to be supported by statutory powers for operating them as self-supporting undertakings with, however, elimination of wasteful processes. Measures are proposed for reducing the number of road accidents, which have increased alarmingly; where traffic can be efficiently conveyed by rail or water, its movement by road, while profitable to certain interests, is regarded as undesirable, partly as aggravating the accident problem. The new legislative proposals are being made, the Government claims, with the objects of greater equity in taxation and transport rates and fares, increased co-operation between railway and postal departments and reduction of unnecessary heavy vehicular traffic destructive of the roads.

## LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of correspondents)

### Profit Sharing

August 12

SIR,—With the increasing introduction of profit-sharing schemes in private industry, the time is, I feel, opportune for adoption by the British Transport Commission of a very simple bonus scheme for the railways, which would help to overcome the general feeling amongst the staff that they have no direct interest in the efficiency or economy of the undertaking.

I suggest that each year a target net revenue should be fixed, and if this figure is reached, a bonus, at a rate to be agreed, paid to every eligible member of the staff; for each £1,000,000 net revenue in excess of this target the bonus to be increased by an additional amount.

I am certain that this scheme would have the effect of increasing the interest and efficiency of the railway staff, with consequent improvement in net revenue.

Yours faithfully,

T. R. MORGAN

14, Norfolk Square, W.2

### Clean Locomotives

August 12

SIR,—Having occasion to be at Victoria Station about 10.30 p.m., I was amazed and delighted to see a Southern Region "King Arthur" class engine No. 30768, *Sir Balin*, looking as if it had just been got up to haul a Royal Special. The polished buffers, smokebox door hinges, rails and frame ends were gleaming; the copper injector pipes shone like old-fashioned kitchen utensils; and the whole engine had practically an exhibition finish. When I asked the young fireman the reason, he told me, with blended modesty and pride, that it was the pleasure of his "gang" to keep the locomotive in this condition.

I understand that her regular run is down to Ramsgate at 3.35 p.m. and back with the 7.45 up. It is much to be hoped that passengers notice and appreciate the splendour of the locomotive which pulls them, and which certainly no one could imagine to be a veteran of nearly 30 years' standing. It shows what can be done where there is enthusiasm. *Sir Balin*, today is a literally shining example and a credit to British Railways.

Yours faithfully,

HENRY MAXWELL

106, Ashley Gardens, S.W.1.

### Passenger Timetables and Rolling Stock

August 8

SIR,—In my letter in your July 16 issue I was careful to mention the great improvement in train services that had resulted from the original electrification schemes undertaken by the Southern Railway in a period of considerable financial stringency. However, while British Railways are still not financially well off, they are facing increasingly severe competition from road traffic and may also do so from helicopters in the near future. Whether we like it or not, the pace of modern life is continually increasing, and unless the railways can keep ahead with the facilities offered, they will lose much custom. With short-distance traffic especially, what was an outstanding improvement 20 years ago could become slow and inadequate in very few years from now.

Brighton and Hastings are only 33 miles apart as the crow flies and little more by road. Yet the fastest journey that can be made between the two by the normal electric service requires no less than 70 min., due partly to the

reversal required at Eastbourne. With improved stock and a rearrangement of timings, it should be possible to provide an accelerated service that would compete more advantageously with travel by road between these two important towns. It must not be overlooked that an increase in overall speed alone can result in the use of less stock, thus enabling more lavish equipment to be provided on individual units, within the same total outlay.

Yours faithfully,

P. W. B. SEMMENS

52, Belle Vue Grove, Middlesbrough

### Anglo-Continental Traffic

August 13

SIR,—Your editorial comment on my letter published in your issue of August 13 is not quite fair, and the arguments are in any case specious. You state that "most travellers . . . either stay in London or seem not to object to passing through it." I contest this most strongly: they do mind—and are rapidly transferring their patronage to the motorcoach and the air. The "demand" for through services, as "Montcler" also asserts in your issue of August 6, can only be judged when they are supplied; the coach and air transport companies are supplying them, while British Railways are not.

The assimilation of timetable dates is equally not a matter of the proportion of local to international traffic, but of whether British Railways really mean to abide by the implications of their membership of the International Union of Railways or not. The proportion of international to local passenger traffic on British Railways, is, as a matter of fact, far higher than on the Spanish, Norwegian, Finnish (practically nil), Swedish, Hungarian, and railways in all other "iron curtain" countries. The difference in climate between Finland and Spain does not, however, cause the railway administrations to initiate summer and winter timetables at different dates. It simply causes high-season trains to run at different times within the summer timetable, just as many such trains run for only part of the duration of the British Railways timetable.

May I also say that I far prefer the word "international," to "Anglo-Continental"? The latter only fosters the idea that Europe consists of only two countries: England and the Continent. The differences between the Scandinavian and Mediterranean countries are never greater than between, say, Great Britain and Holland.

Yours faithfully,

G. H. HAFTER,

107, Mortlake Road, Kew, Surrey

[The passenger complement of a road vehicle or an aircraft does not normally exceed that of one railway coach. There are operating difficulties in providing through services between ports in S.E. England and provincial stations, and the through journeys probably would not be more convenient than via London. Assimilation with Continental railways of the duration of timetables is complicated by the very great density of traffic on British Railways. As it is, the adjustment of British Railways steamer and boat train schedules during the periods when British and Continental summer and winter timetables do not correspond, is done without inconvenience to travellers. Except for Finland and possibly Eastern Europe, we doubt whether, including freight, the proportion of railway traffic between any two adjacent Continental countries to their internal traffic is less than in Great Britain. Because this country is an island, with the train-ferry and packet ports situated as they are in relation to London, British Railways Anglo-Continental traffic is likely to remain as a matter dealt with to some degree apart.—Ed., R.G.]

## THE SCRAP HEAP

### Old Familiar Noises

A generation ago every small boy wanted to be an engine driver, but on the diesel engine the driver can scarcely be seen. A man who merely sits and pulls a lever now and then is not so attractive a figure as the one who used to lean out on the footplate in the station and wait for the guard's shrill whistle and wave of his green flag. The new type of Belfast-Bangor train is a much more silent affair than the one of former times. No banging of doors or hissing of steam in the station—just a gliding open and shut of a sliding door, a throbbing pulse of quiet engine, and the diesel train glides on its way. Two familiar noises have now disappeared—the shrill whistle of the Belfast & County Down Railway engine and the rattle of the city tram, with its sharp tinkling bell clearing the track as it rattled over the rails.—*From the "Belfast News-Letter."*

### Chapel Car for Pilgrim Trains

A chapel car is reported to have been included by the Münster Division of the German Federal Railway in pilgrimage trains between stations in that division and Lourdes and Rome. The car contains all that is to be found in a chapel, including a harmonium. The services are broadcast throughout the train by loudspeakers to sick and other passengers who cannot leave their places.

Chapel cars at various times have been provided on railways in sparsely populated regions, as in South Africa and the U.S.A., where they are moved as required from station to station and form temporary places of worship for railwaymen and other residents or are used as mission stations. The first such car seems to have been on the Trans-Siberian, at the beginning of the cen-

tury. The broadcasting of religious services in pilgrimage trains is believed to have been first practised on the Belgian National Railways, some 20 years ago.

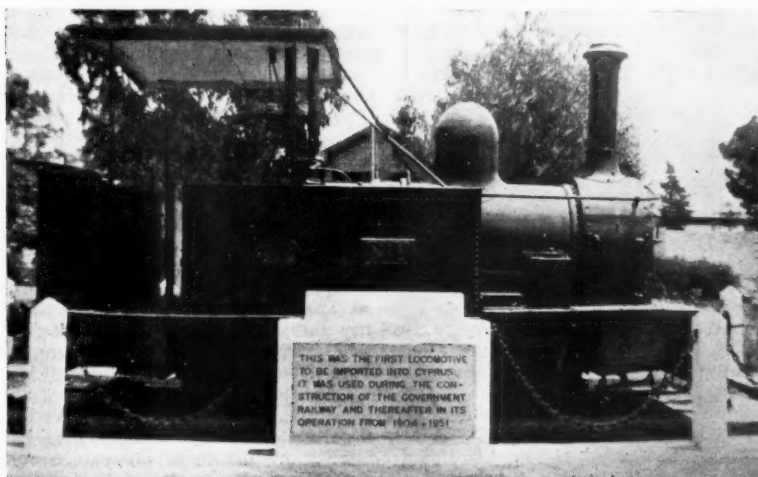
### Grave Northern Stations

An unexpected admirer of London's larger railway stations was Henry James. He liked them aesthetically; they interested and fascinated him, and as he puts it delightfully in his essay on London, "I view them with complacency even when I wish neither to depart nor to arrive." Perhaps because he dates his first strong impression of London from his arrival from Liverpool at Euston and his drive through the winter streets in a "greasy four-wheeler," he had a preference for "the grave northern stations."

He was most delighted at the spectacle at Paddington, Euston, or Waterloo in the foggy season, but the basis of his pleasure in them did not stand upon the weather but upon the fact that the larger London stations reminded him of how the English and Americans were "all distinguished together from other people by our great common stamp of perpetual motion, our passion for seas and deserts and the other side of the globe."—*From "The Manchester Guardian."*

### Surviving Cypriot Locomotive Preserved

The accompanying illustration which has been sent by a correspondent shows 0-6-0 Hunslet-built locomotive No. 1 of the former 2-ft. 6-in. gauge Cyprus Government Railway preserved at the Police Station, Famagusta. A photograph of the engine still standing in Famagusta Station in June, 1953, was published in *The Scrap Heap* of September 11. The railway was closed to traffic at the end of 1951.



Photo]

[R. Gosling

Cyprus Government Railway locomotive preserved at Famagusta Police Station. It was built in 1904 by the Hunslet Engine Co. Ltd. (works No. 846)

### Passenger to Purr-th

A kitten about six weeks old was found perched on the engine of an express train when it arrived at Perth from Crewe—286 miles away. The kitten—frightened and looking very, very miserable beneath a coating of thick oil, had climbed on the engine at Crewe, attracted by the heat. It was discovered at Perth when the driver and fireman heard a miaowing. Station staff cleaned the oil off and now the kitten is to be kept there as a pet.—*From the "Daily Express."*

### Back to the Rocket?

(See *The Scrap Heap* of August 13)

"I merely like most brother railwaymen

Would like the good old colours back again"

Says sprite A. B. in accents pained and low.

But tell me, A. B., how far back to go?

When I was yet a little boy at school  
My father swore that railways played the fool;

He roundly cussed his daring railway boss

For moving boat trains out of Charing Cross.

And I, his small son, surely took up arms

Back in the days of Great War's first alarms—

That one day soon the bright chestnut and green

Of his beloved trains would not be seen.

That really came to pass in my own days

When, invoicing, bewildered, in a haze  
Of strange new orders, I became apprised

That we were all to be "South-Westernised."

We thought those "Westerns" full of strange ideas;

Enough to drive "South Easterns" out for beers:

Yet as time passed, we forgot our spleen  
And even lived to stand South Western Green (ugh!).

Now A. B. pleads wistfully in rhyme  
That he indeed seeks no machine of time,

Admits that change's challenge must be met

With courage, vigour and such stuff, but yet. . .

He wants his engines back in various hues—

So near were most the colours, why refuse?

I'll yet agree his concept isn't bad  
If he'll accept the colours of my dad!

A. C. P.



## OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

### RHODESIA

#### Reservation Charges Lowered

The railways have brought in a reduced scale of excess fares for the reservation of coupes and compartments, when available, on all passenger trains throughout the Rhodesias and to and from the Beira Railway and the South African Railways.

In terms of the old rates a passenger desiring a first class coupe to himself could obtain one, if available, and at the discretion of the railways, for one-and-a-half first class fares. Under the new rates the charge is only one-and-a-quarter first class fares.

A first class four-berth compartment could be reserved by one person for himself, by payment of three first class fares. This has now been reduced to two-and-a-half first class fares. Similarly, two persons reserving a full compartment now pay two-and-a-half fares instead of three fares, and three persons three-and-a-quarter fares.

### INDIA

#### Free Travel for M.P.s

Members of the Indian Parliament are now allowed to travel free over the Railways. Every member has been provided with one free non-transferable second class pass which entitles him to travel on any line in India and at any time.

#### Success of "P.L.M." Week

As a result of the "P.L.M." (pack-label-mark) drive launched by the railways there has been an improvement in the safe transit of packages. During the first check, conducted in October, 1951, after the drive had already been in force for some time, senior railway supervisory staff scrutinised 986,828 packages, of which 60 per cent were found satisfactory in all respects. During the fifth check, in December, 1953, the number of packages scrutinised was 1,513,670 out of which 84 per cent were found satisfactory in all respects (packing, labelling and marking). The drive has had marked results in reducing losses and claims.

#### Shoranur-Nilambur Line

The Angadipuram-Nilambur section of the Shoranur-Nilambur line was reopened to traffic on April 15. This branch from Shoranur was originally constructed in 1925-26 and opened for traffic in February, 1927. During the war, the Government of India, in consultation with the Government of Madras, ordered the closure of the entire section and the line was dismantled in December, 1940. The track was transported for use in an overseas theatre of war. In 1951 the Railway Board sanctioned the restoration of this

line and the work was commenced in June, 1952. The first stage, comprising the Shoranur-Angadipuram section, was opened for traffic in April last year.

The reopening of the branch is of considerable importance, as timber and other forest produce from the rich reserve forests of Nilambur now find an easy outlet to Cochin Harbour via Shoranur.

#### New Lines Opened Since the War

Approximately 669 miles of new lines other than dismantled lines restored have been opened since the end of the war. Shri O. V. Alagesan, Deputy Minister for Railways & Transport, stated in a written answer in the Council of States that the post-war railway reconstruction scheme prepared by the Ministry of Railways in consultation with the State Governments envisaged the construction of some 4,000 miles of new lines.

He gave the new mileage of new lines for which provision had been made in the years from 1948-49 to 1952-53 and in the budget for 1953-54.

### NEW ZEALAND

#### Progress of Rimutaka Tunnel Line

The second of the two tunnels on the new line through the Rimutaka mountains to the Wairarapa has been pierced. Concreting and the southern portal are still to be completed. The 350-ft. ventilation shaft to the interior of the main tunnel has now been bored 250 ft. and is expected to be through shortly. It will then be drilled larger and concreted.

Track laying on the deviation will start in a few months' time from the Mangaroa Station yard. All contractors' work will be completed by the end of the year and the line should be open for traffic about the middle of 1955, provided supplies of material come to hand as needed.

One of the last jobs will be the laying of the new line across the old line about half-a-mile from Upper Hutt. This will have to be done at weekends so as not to disrupt normal traffic.

### CANADA

#### Decrease in C.N.R. Revenue

The decreasing volume of traffic being carried by the Canadian railways is again reflected in lower earnings reported in the monthly income and expense statement of the Canadian National Railways for the month of June, and in the aggregate figures for the first six months of 1954. Operating revenue was \$55,674,000 in June, a decrease of \$5,884,000 compared with the corresponding month of last year. Operating expenses this year were \$52,543,000. Last year they totalled \$56,837,000.

Although expenses for the first six months of 1954 were reduced by \$24,297,000, the net revenue position of the C.N.R. showed a decrease of \$9,146,000. Gross revenues for the six-month period were \$33,443,000 below the corresponding figure for 1953.

These figures are the operating revenues and expenses only and do not include taxes, equipment rentals and fixed charges.

#### Signalling on C.N.R. Lakehead Line

The Canadian National Railways have started operation of an automatic block signalling system on the double-track line between Port Arthur and Conmee.

Automatic block signalling, combined with the operation of centralised traffic control between Conmee and Atikokan is accelerating train movement on the C.N.R. line between the Lakehead and Atikokan and dispenses with the issuance of written train orders.

#### Plastic Linings in Passenger Stock

New passenger cars now being delivered to the Canadian Pacific Railway by the Budd Company include plastic linings on the interior walls. These lining are pleasing in appearance and easy to keep clean; they have been used by the C.P.R. for some time.

### UNITED STATES

#### Reduced Fares in Texas

In a determined effort to win passenger traffic back from the roads, the Missouri-Kansas-Texas Railroad on June 15 announced a considerable reduction in "coach" (third class) fares. 'As an example, the fare of \$13.30 from Dallas to San Antonio and back (2.25 cents a mile) was reduced to \$8.80 (1.5 cents a mile), and compares with the \$11.30 charged for the same journey by motorcoach. It is estimated that passenger traffic will need to be doubled to ensure no loss in revenue. The plan is to operate for six months, and within the State of Texas only.

#### Luxury Excursions

An experiment in providing cheap excursions with luxury stock was tried by the three competing railways operating express passenger service between Chicago and Minneapolis, at the weekend June 18 to 20 last. The round trip fare for the journey of over 400 miles each way was fixed at \$10, or less than 1¼ cents a mile, and from Milwaukee to Minneapolis and back (by the Milwaukee and North Western lines) at \$8.

Each of the three companies concerned used the latest stock from its streamline services, including dining, café-lounge, and dome observation cars. Tickets were sold in advance on

a seat-reservation basis; in the outward direction departures were on the Friday evening, and on the return on the Sunday evening, giving almost two full days in St. Paul and Minneapolis.

The Chicago, Milwaukee, St. Paul & Pacific used stock from its "Hiawatha" services to make up special trains in each direction, which it called the "Hiawatha Coach Cruise." The Chicago & North Western attached luxury coaches from "The Twin Cities 400" to the "North Western Limited" both ways, and the Chicago, Burlington & Quincy used the "Black Hawk-Western Star" night express for the same purpose, and, like the Milwaukee, included the popular dome cars in its formation. The Milwaukee allowed passengers to and from certain intermediate stations to use its special trains, and the North Western permitted its excursionists to return by other trains if they wished.

#### Minneapolis & St. Louis Changes Hands

In addition to the New York Central and the New York, New Haven & Hartford Railroads, the Minneapolis & St. Louis has undergone a change of management as a result of a long and acrimonious battle for proxy support.

At the annual meeting on May 11 and 12, a group of stockholders headed by Mr. Ben W. Heineman, a lawyer, secured a three to two majority, and so was able to elect seven of the 11 directors and gain control. Mr. Lucian C. Sprague had relinquished office as president some months previously, and had been succeeded by Mr. John W. Devins, who is expected to be confirmed in his position by the new board; Mr. Heineman has indicated that he has no wish to become chairman, but that an executive committee will be established within the board to control financial matters and check any tendencies to extravagance.

Among probable developments will be the removal of the railway's office in New York to the operating headquarters at Minneapolis, a survey of the property by an independent investigator, and, possibly, ultimate merger of the line with a larger railway.

## COLOMBIA

### New Railways

The Colombian Government has decided to construct a 64½-mile line from Armenia and Ibagué, in the Central Cordillera Range, to link the western group of lines based on Buenaventura, the Pacific seaport, and the eastern group serving Bogotá. The new line is estimated to cost \$40,000,000 including a \$2,500,000 tunnel and, like the other lines in the State, will be of 3-ft. gauge.

Another recent decision is to extend the Magdalena Railway, now under construction from La Dorada to Capulco, right through to Santa Marta, on the Atlantic seaboard, whence a detached line runs inland to Fundación. When

these two lines are completed, there will be direct rail communication from Buenaventura to the capital, Bogotá, and to Barbosa Tunja and Sogamoso in the east, and (2) from the Pacific coast at Buenaventura and Santa Marta on the Atlantic, via both Armenia-Ibagué and via Medellín. The alignment of the 236-mile Magdalena Railway was described, with a map of the whole country, in March 27, 1953, issue.

## FRANCE

### Mont Cenis Motorcar Traffic

Motorcar traffic by rail through the Mont Cenis Tunnel was exceptionally heavy at Easter. The busiest day from France to Italy was the Saturday before Easter when 163 cars were despatched from Modane to Bardonecchia; in the return direction 155 cars were received at Modane on Easter Tuesday. During the two weeks commencing Saturday, April 10, 1,276 cars were conveyed from France to Italy and 896 vehicles in the reverse direction. The revised arrangements for the conveyance of cars through the Mont Cenis Tunnel on fixed rakes of flat wagons were described in our November 27, 1953, issue.

### Rail Crack Detection

Cracks in rails have been more in evidence on the S.N.C.F. since than before the war, and for reasons of safety it was necessary to detect these cracks in the open track. This was particularly difficult with lateral fractures of the head of the rail (oval blemishes), as they originate in the lower part of the head, and rail breaks may occur before the crack is visible on the surface.

A rail testing car was therefore designed and put into service in March, 1953. By means of an electro-magnetic

examination, the seat of possible cracks can be determined and this can then be followed by an electric test to confirm or otherwise the magnetic indication and pin-point the crack.

### Track Tests

During 1953, inspection of 854 miles of track was carried out, and 209 serious defects were discovered including 94 lateral fractures. During this period both the electro-magnetic and electric tests were carried out from the one vehicle. In future the testing car will only undertake the electro-magnetic test, mobile teams performing the electric test. In this way it is hoped to cover some 3,105 miles of track a year.

### Tests of Welded Rail

In conformity with the policy to install welded rail in lengths of 800 m. (874 yd.), the S.N.C.F. has been carrying out tests to ascertain whether less energy is used in running trains over welded track than over the normal short lengths of rail.

On the Révigny—Bar-le-Duc section of the Paris-Strasbourg line, one track was equipped with long-welded rail with elastic spikes over a distance of 6.5 km. (four miles), and the other with 18 m. (59 ft.) lengths of rail. Experiments were carried out with various types of train made up of passenger or goods stock hauled by a 4-8-2 passenger locomotive or a 2-8-2 freight locomotive. A dynamometer car was used.

Each test involved a train running outwards on one track and returning immediately on the other, followed by further runs in opposite directions on each track. Identical tests were carried out in the morning and the afternoon. No measurable difference in energy consumed was shown by these tests.

### International Continental Express Working



Photo]

[A. Earle Edwards -

German Federal Railway 2-8-2 locomotive about to leave the Dutch-German frontier station at Venlo with the southbound "Rheingold Express"

## A Paradox of Modern Railway Management—1

*The prosperity of a railway is quite independent of "efficiency" as measured by operating statistics*

By A. R. G. Saunders, B.Com.

Acting General Manager, Sierra Leone Railway

**I**N railway operation maximum efficiency is achieved when each wagon is loaded to capacity and when each locomotive is hauling a full load; when in fact there is no wastage of effort. There can be no argument about this, and a great variety of statistics is available on railways to measure the degree of such efficiency that is obtained. Much effort is expended, on many railways, to secure greater efficiency as measured by these statistics.

After these statements it seems odd to assert that the prosperity of a railway is quite independent of "efficiency." To say that a railway actually

an improvement in efficiency as measured by the operating statistics. The expansion of revenue was accompanied by a decline in efficiency.

### Fixed and Variable Costs

Railway costs are comprised of two elements, the fixed costs, which within very wide limits do not vary with the volume of traffic, and the variable or operating costs incurred in the actual carriage of the goods and passengers. The latter are, by comparison with the fixed costs and by comparison with the rates and fares, quite small, much smaller than is generally realised.

half that which was received with a single train. The revenue per train-mile, the number of passengers per train-mile, the revenue per vehicle-mile; clearly none of these figures have any significance whatsoever in deciding whether to increase a service. The only matter of importance is, whether, in the example, an increase of 10 per cent in traffic will occur as the result of doubling the operating costs.

It will clearly pay a railway to double its operating costs, in such a case, merely to secure a 10 per cent increase in the volume of traffic. The resulting decline in operating efficiency is of no consequence at all.

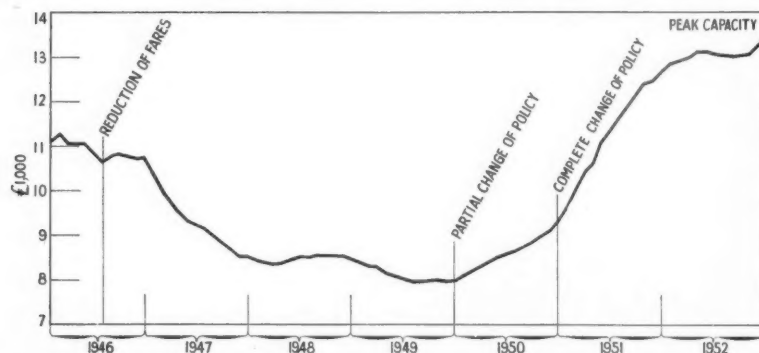


Fig. 1—Trend of passenger revenue of Sierra Leone Railway, 1946-52

prosper more if efficiency declines seems nonsense. Nevertheless, it is quite true and, moreover, not difficult to prove. It is not merely true as a special case; it is true generally. Failure to appreciate the truth of this apparent absurdity, and what to many must seem heresy, is probably the greatest single cause of financial difficulty on railways, for too often railway managements are preoccupied with "efficiency" in the natural belief that the prosperity of a railway depends on it.

The reason why railway prosperity is independent of "efficiency" and actually inversely related to it can be shown most easily in relation to passenger traffic.

Figure 1 shows a trend curve of the passenger revenue of the Sierra Leone Railway for the seven years 1946-52. In just over two years from the beginning of 1950 an increase of revenue occurred, amounting to no less than 70 per cent, secured without any increase in the number of locomotives or passenger vehicles or in the fares.

This increase is in marked contrast to the steady decline in the three preceding years, which owed its origin to a preoccupation with efficiency. The decline in revenue was accompanied by

The text books are extremely vague on the subject, but it is quite easy to show that on the Sierra Leone Railway the operating costs of any train are fully covered if the train is only 10 per cent full. This cost is actually quite high compared with other railways and this is partly the result of the line being of only 2-ft. 6-in. gauge. On other railways this percentage to capacity might be as low as 5 per cent or even less.

### Effect of Increased Services

Whatever the actual level, the implication is important, and can best be demonstrated from a simple illustration. If a train service is composed of one train a day and if this train is more or less full, then an increase of only 10 per cent in the volume of traffic will justify an increase of the service to two trains a day. This small percentage increase will more than compensate for a doubling of the operating costs.

If two trains are run in place of one, then the total revenue in terms of train-miles will show a decline, unless both trains are more or less filled, that is, unless the volume of traffic also doubles. If a 10 per cent increase of traffic does occur, then the revenue per train-mile will be slightly more than

### Elasticity of Demand

In other words, the prosperity of the railway is quite independent of the "efficiency" as measured by the passenger operating statistics. It is dependent upon one thing and one thing only: the elasticity of demand. Even although the operating costs were actually higher, the same argument would apply although, in such a case, a greater expansion of demand would be necessary to justify the doubling of the operating costs. The 70 per cent increase in passenger traffic recorded in the diagram was produced in response to an increase of operating costs less than twofold.

Moreover, if expansion of revenue is to be encouraged, this can only occur, except in special circumstances, in combination with a decline in efficiency as measured by the operating statistics. On the other hand, if a high standard of efficiency, as measured by the operating statistics, is the objective, and policy is directed towards securing a higher standard of operating efficiency, then expansion will be inhibited.

The waste which occurs when trains are but half-full, or even sparsely filled, is only an apparent waste. It is not necessarily an economic waste; and the same arguments can be shown to be true in the case of goods traffic. The prosperity of a railway is dependent, not on efficiency as measured by the average wagon load, the average train load, the trailing ton-miles per engine-hour, but upon the elasticity of demand.

### Freight Revenue

Figure 2 shows a trend curve of the freight revenue of the Sierra Leone Railway in 1949-52. As with passenger revenue, in a matter of two years a considerable expansion of revenue took place, an expansion that was due to the same cause.

Between 1947 and 1949 a preoccupation with "efficiency" resulted in



traffic being lost, a loss which unfortunately cannot be shown in terms of revenue because of increases in certain rates in 1948. From 1950 onwards, this policy was changed with a resultant increase in goods revenue.

It is not possible to show the comparison between the two policies as to the final result, as this was affected by increased wages and increased costs of materials throughout the whole period. It is quite impossible to isolate the final result accruing from the passenger traffic from those accruing from goods traffic in terms of the actual operating costs. Nevertheless the expansion of revenue far more than covered the actual extra costs involved in implementing the new policy.

The problem of a railway is to earn sufficient revenue to meet fixed costs. This end is not achieved by improving efficiency; and in fact if an improvement in "efficiency" is the objective then revenue will stagnate. Apart from the instinctive preoccupation with efficiency of technicians, statisticians, and those who see in the apparent anarchy and wastefulness of commerce an opportunity to introduce scientific methods, it is of special interest to find another reason why a railway management becomes preoccupied with efficiency.

#### Budgeting

The Sierra Leone Railway is Government-owned. In common with other similar railways its expenditure has to be budgeted in advance and approved by the legislature. Commercially-owned railways do not have to do this. They finance their ordinary expenditure from revenue. The managements of such railways can concentrate, without restriction, on the primary task of increasing revenue. They can speculate with rates and services to this single end without the need to give thought to efficiency as measured by the operating statistics.

When a railway has to forecast its expenditure for a period up to 18 months ahead, however, the position is quite changed. Expenditure is estimated in advance, with an estimate of the revenue to be earned. It is calculated on a given mileage to be run. The effect of this procedure is to put a premium on efficiency. Management is constrained to earn the anticipated revenue with the lowest possible expenditure and this is achieved clearly when efficiency is maximised.

Singular importance in such circum-

stances becomes attached to the statistics of operation. The importance that is attached to them in such circumstances can be gauged from an announcement on page 348 of *The Railway Gazette* of March 26, 1954, that the Nigerian Railway, which is similarly situated to the Sierra Leone Railway in regard to the control of expenditure by the legislature, has introduced a booklet of domestic statistics to be distributed to all supervisory officers. The hope is expressed that an all-round increase in efficiency will result.

After some 50 years of Government ownership the Nigerian Railway is to

a developing territory needs expansion more than anything else.

#### Effects of Rolling Stock Shortage

The expansion of goods and passenger revenue on the Sierra Leone Railway came to a halt in 1952, not because demand was satisfied but because the railway has insufficient locomotives and rolling stock to handle more traffic. The shortage of locomotives and rolling stock has hampered the economic development of the country and the railway has joined those other Colonial railways which refer in their annual reports to an acute shortage of locomotives and rolling stock, a shortage

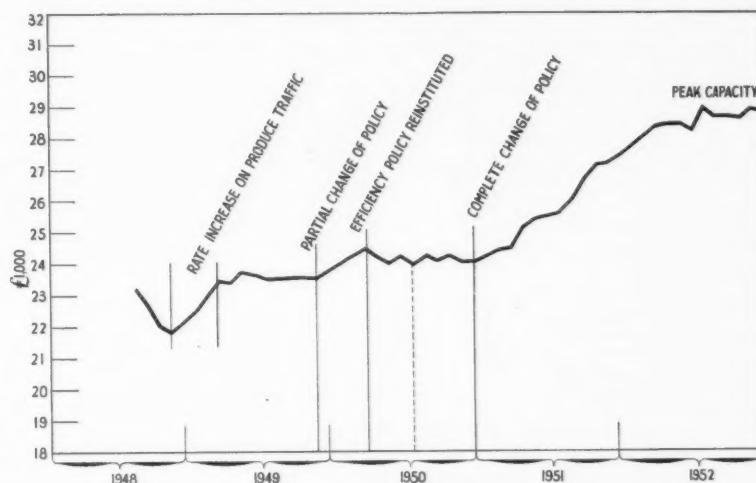


Fig. 2—Freight revenue of the Sierra Leone Railway, 1949-52

be placed under the control of a public corporation. One official reason given for this change is that it is thought that the control of expenditure by the legislature does impose some restraint on the commercial activities of the railway. It is true it does impose restraint, but the major cause of the failure of the railway to foster development is the belief that efficiency is the key to successful management. The pursuit of this wrong objective has enormously hampered the development, not only of the railway, but of the Territory. The accumulation of the great pyramids of groundnuts at Kano in the north of Nigeria can be shown to be the result of the pursuit of efficiency as an objective in the past.

A railway is unique in that technical "efficiency" leads to commercial inefficiency. It also inhibits expansion and

which has a common cause, in the preoccupation with orthodox efficiency.

Railway operating statistics are no more than those which provide a rough-and-ready measure of technical efficiency. The degree of operating efficiency that can be obtained on a railway is dictated by demand. Management cannot dictate it except ultimately to the detriment of revenue. Fortunately, under commercial ownership, commercial managements of railways in the United Kingdom concerned themselves solely with demand. They prospered and expanded.

"Efficiency" and statistics of railway operation are an incubus from which railways must be free. The implicit faith in efficiency must be dispelled, and staff must be re-educated so that other railways may prosper likewise.

(To be continued)

**FRANCE-ALGERIA TRAFFIC CONTAINERS.**—The S.N.C.F. has put into service 1,000 containers built specially for working across the Mediterranean between metropolitan France and Algeria. These containers have a capacity of 7 cu. m. (247 cu. ft.), and can accommodate a maximum load of 5 tonnes. To enable them to be used for ocean traffic the containers have to conform to certain standards. They must not be more than 2 m. (6 ft. 7 in.) in overall height to facilitate stowage in

the tween decks of ships, and there must be a clearance of 110 mm. (4.3 in.) between the base of the container and the ground to enable them to be handled by fork-lift trucks. They must be so constructed as to fit snugly one on top of the other and be strong enough to support the weight of two loaded containers placed on top of them. As the principal traffic between Algeria and metropolitan France is fresh vegetables and fruits, the containers have to be particularly well

ventilated, and they are fitted with twice the usual number of air vents. In the case of 50 of the containers, special ventilating equipment has been installed, incorporating cone-shaped inlets and outlets in the roof of the container. Air passing between the inlets and outlets suck air through holes from the interior of the container, this being replaced through air holes in the floor. Tests are being carried out to decide whether better results are obtained with this form of ventilation.

## Rolling Stock for Pakistan Railways

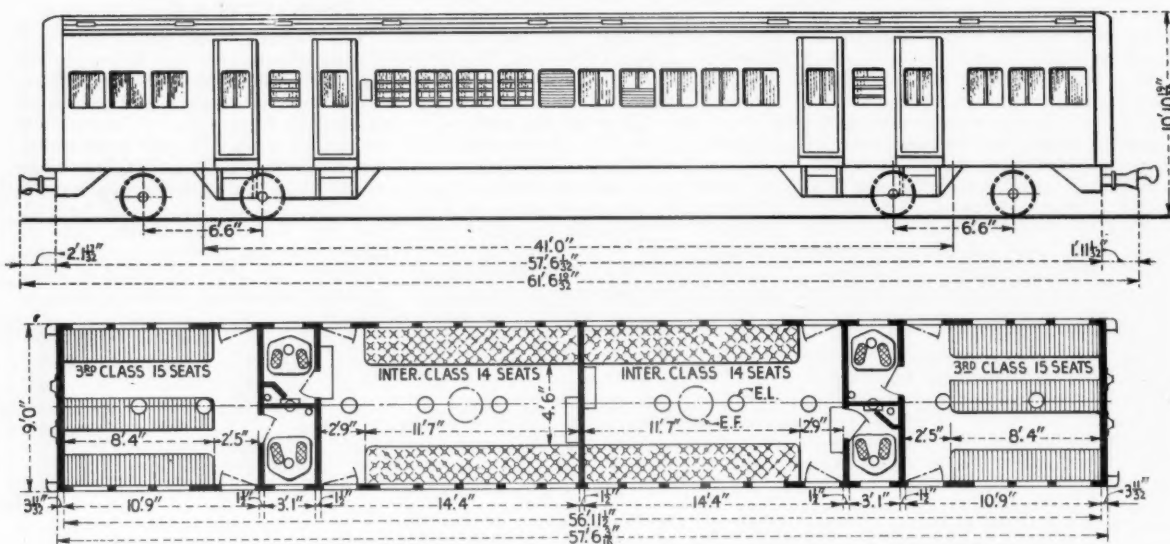
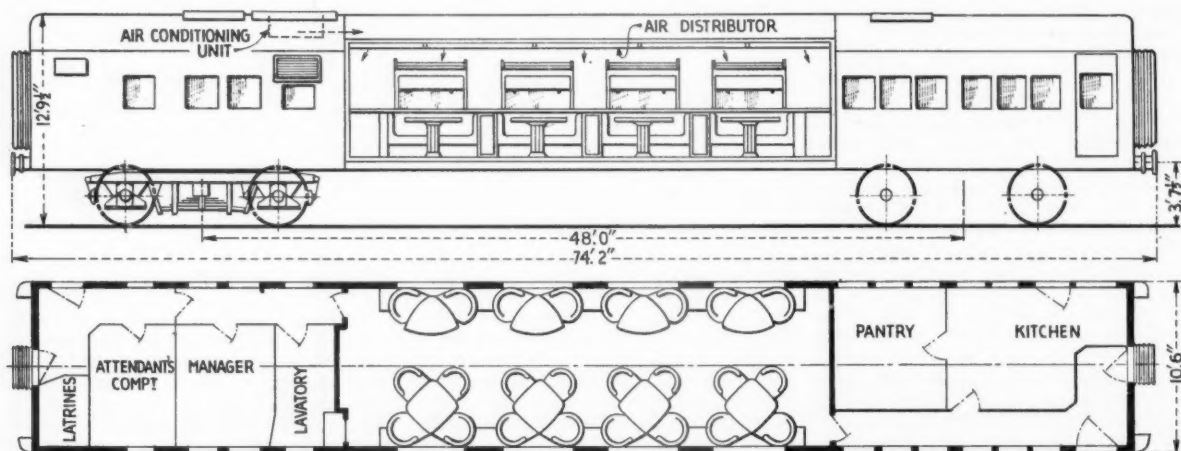
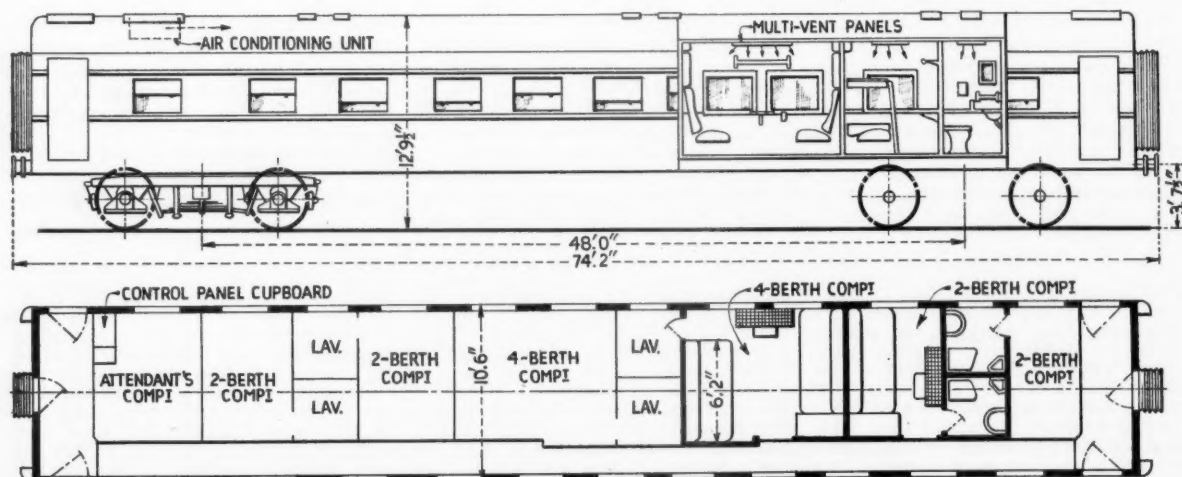


Diagram showing principal dimensions of the Eastern Bengal Railway intermediate and third class carriage



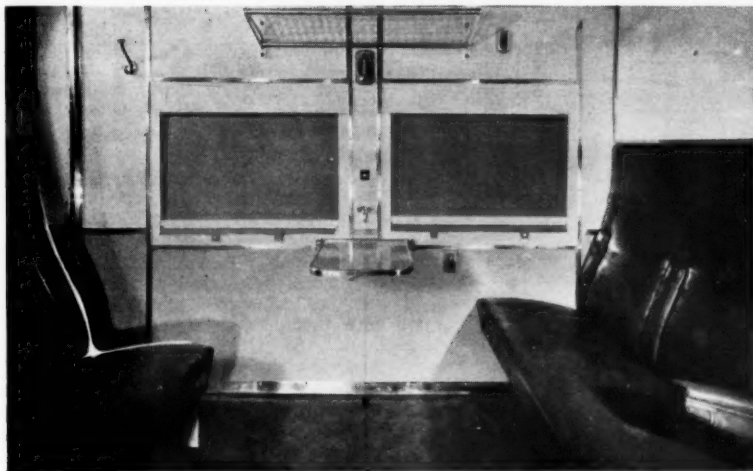
Layout and principal dimensions of the air-conditioned broad gauge restaurant cars



Principal dimensions and arrangements of the broad gauge air-conditioned coaches

## Rolling Stock for Pakistan Railways

*Broad and metre-gauge passenger vehicles of all-steel construction*



*Broad-gauge four-berth compartment in the air-conditioned car, arranged for day travel, showing ample space between seats*

**A** CONTRACT for a considerable quantity of rolling stock was placed in 1951 with a French group of rolling stock manufacturers, the Groupe Français pour Fourniture de Matériel de Chemins de Fer. Much of it has already been placed in service, the first batch having been shipped during April, 1953, by Belships Co. Ltd. Skibs A/S.

The order for the broad-gauge stock for the North Western Railway consisted of 122 bogie passenger coaches comprising ten *de-luxe* air-conditioned sleeping cars, five air-conditioned restaurant cars, 25 first and second class composite coaches, five second

class coaches, 42 inter-class, and inter-class and thirds, some with postal and cold storage compartments and 39 third class of varying types.

### Metre-Gauge Composite Stock

For the Eastern Bengal metre-gauge system, the order comprised a total of 113 bogie passenger coaches, consisting of 20 first and second class composite coaches of coupé design, three first, second, inter, and third class composite coaches, 20 inter and third class coaches, and 70 third class carriages, some with postal, and others with luggage compartments.

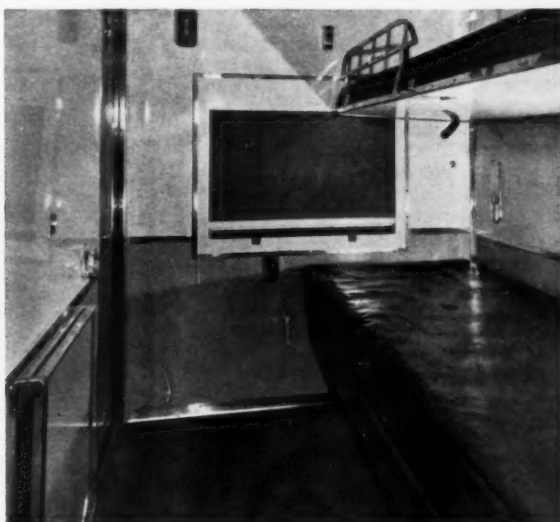
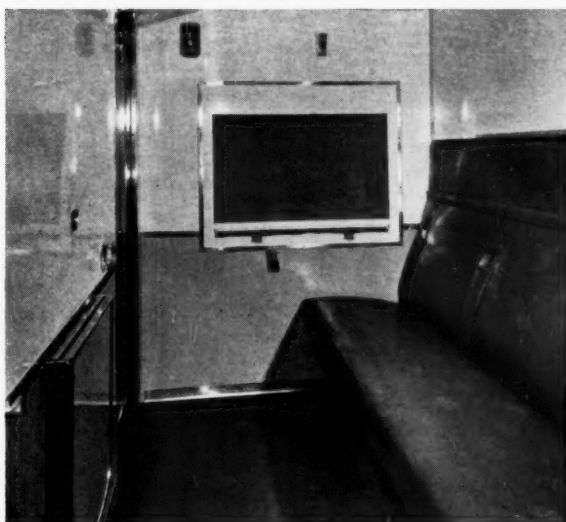
The entire stock was designed in

France according to Pakistan Railways specifications, particular attention being given to the problem of weight. The broad-gauge rolling stock is 74 ft. 2 in. over buffers and the tare weight of the third class stock is 31 tons. The metre-gauge stock is 61 ft. 6 in. over headstocks, and the tare weight is 22.7 tons.

The coaches were subjected to severe inspection tests. These consisted principally of combined strain gauge testing of the body shell by means of horizontal and vertical loads applied simultaneously. For the broad-gauge coaches, the horizontal compression applied to the buffers was 200 tons, while a vertical load of 38 tons was divided over the entire structure.

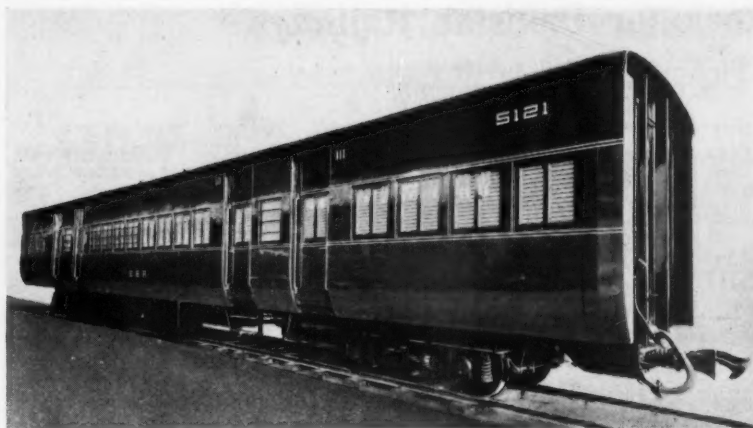
In the case of the metre-gauge stock a horizontal compression of 150 tons was applied to the drawgear casing ten inches below the headstock; the divided vertical load was 36.8 tons. Integral construction was adopted on all rolling stock. The specifications laid down that the fatigue strengths were nowhere to exceed 80 per cent of the yield strength. This was achieved by a shell design in which the steel side sheeting contributes to the general rigidity of the whole structure; welding was used extensively.

In general design, the bodies of all the stock are similar, consisting of U-shaped pillars forming a box-type framework specially reinforced at the ends by U-shape intermediate pillars. Copper-alloy steel sheeting has been widely used having a resistance of 40 kg./mm. <sup>2</sup>, a yield strength of 24 kg., and an elongation of 25 per cent. Insulation is provided by means of sprayed asbestos; in the air-conditioned stock insulation is increased by



*Two-berth compartment in the air-conditioned broad-gauge stock arranged for day travel, and (right) the compartment arranged for night use. Entrance to lavatory is on the left*





*Metre-gauge third class passenger carriage for the Eastern Bengal Railway*

means of Isovex fibre on the bodysides and ceilings, and a layer of slab cork on the floors.

#### **Bogie Design**

The bogies of both broad and metre-gauge stock are similar in design. A primary suspension, composed of two helical springs on each axlebox, supports the bogie frame. The bogie bolster rests on a secondary suspension consisting of longitudinal laminated springs secured to the bogie frame by springlinks on an inclined plane which ensures the centering of the suspension.

The bogie frame is of both welded and riveted construction. The frame longitudinals are fabricated and welded, as are also the brake hanger brackets. The headstocks are riveted to the side frames, and the safety brackets bolted to the side frames are secured by castle nuts. Roller-bearing axleboxes, supplied jointly by British Timken Limited and Société Anonyme Française Timken, are fitted to all rolling stock.

The underframes are jig built and constructed mainly of pressings. Welding is largely used and liberal use is made of cross-bracings of lightweight design, which are welded to the centre longitudinal and solebars. The diagonals from the bogie stiffening to the headstocks are riveted. The body structure is composed of pressings and angles and is also of welded construction; the finish provides a flush exterior.

All stock is similar except that the air-conditioned restaurant, and sleeping cars, have end vestibules. Fluorescent lighting is provided. Spring-type upholstery is fitted to all stock except the third class carriages, which have timber slatted seats. The luggage racks in the third class stock are also of timber slats, and wide enough to be used as berths if required. Electric fans are installed.

#### **Air Conditioning**

The air-conditioning equipment is supplied by J. Stone & Co. (Deptford) Ltd.; the operating voltage of the

equipment is 110/135 V. a.c. Outside air is drawn into the interior of the cars through grilles and filters mounted in the sides. Clean air is then mixed with a proportion of air drawn from the passenger space, filtered, and the mixture is then drawn over the elements in the roof unit where it is cooled and dehumidified, or heated as required.

The conditioned air is discharged through the transition duct into the main distribution duct which runs the full length of the air-conditioned space, whence it is distributed into the compartments by adjustable slot discharge. Part of the air in circulation returns to the air-conditioning unit in the roof through return air-grilles and filters, and the remainder, equal to the amount of the outside air drawn into the car, is allowed to escape to atmosphere, part being used to ventilate the kitchen, corridor, lavatory, and so on.

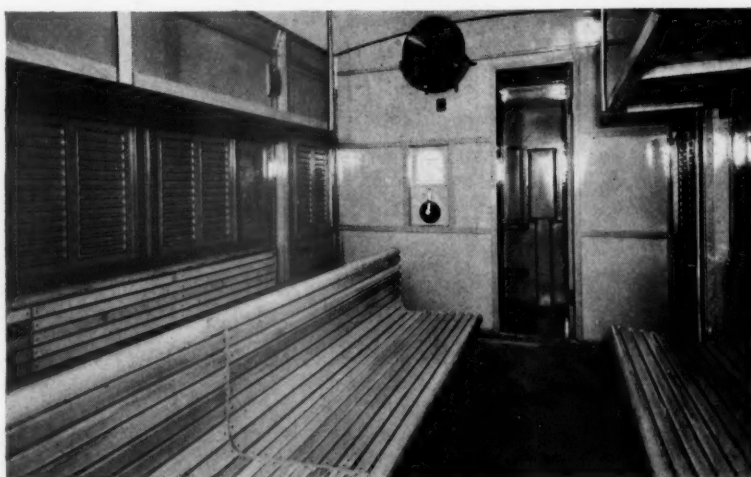
Cooling and dehumidification are effected by means of electro-mechanical refrigeration, using Freon as the refrigerant. The compressor and con-

denser units are mounted on the underframe, and the evaporator coil is in the roof unit. The refrigerant condenser is air-cooled by impeller-type fans, belt-driven from a fan motor mounted on the end of the unit. Electric heating is by elements mounted in the roof unit.

Heating and cooling are thermostatically controlled, the transition from one to the other being automatic. Controls on the cooling-side are effective-temperature type, which take into account relative humidity as well as dry bulb temperature of the ambient air. Provision is made for operating the equipment from an external a.c. supply to pre-heat or pre-cool the cars before starting their run.

The a.c. motor is incorporated with the d.c. generator, the armatures of both machines being on a common shaft. The drive from the axle is taken through a clutch, mounted on the shaft extension. When the cars are stationary the clutch is free, so that the motor generator is disconnected from the axle drive. When the a.c. motor is connected to an external a.c. supply, it drives the generator to operate the equipment and charge the batteries. The a.c. motor is operated on a 380 V. three-phase, 50-cycles supply.

**NATIONAL TRAFFIC CENSUS.**—Highway authorities throughout Great Britain, working in co-operation with the Ministry of Transport & Civil Aviation, on August 16 started the first comprehensive traffic census to be held since 1938. The purpose was to determine the growth and trend of modern traffic, and more particularly any changes in the general traffic pattern. The census is being taken on all trunk and Class I roads. It continues until August 22 inclusive. With certain variations, the census points are the same as in 1938. One change is a reduction in the categories of buses and coaches from four to two, and the separation of light vans and lorries (up to 30 cwt.) from the heavier vehicles.



*Third class compartment of the metre-gauge stock showing the fountain and handle for drinking water*

## Victorian Railways "J" Class Locomotives

*Built for 5-ft. 3-in. gauge, the engines can be converted to 4-ft. 8½-in. gauge*

**A**MONG the steam locomotives at present being constructed by the Vulcan Foundry Limited are 60 2-8-0 "J" class engines for the Victorian Railways. The locomotives, which have a tractive effort of 28,650 lb. at 85 per cent boiler pressure, and a maximum axleload of 14.75 tons, are designed to negotiate a minimum curve of 462 ft. radius. Thirty will be arranged for coal firing, and 30 for oil burning. A feature of the design is that though the engines are being built

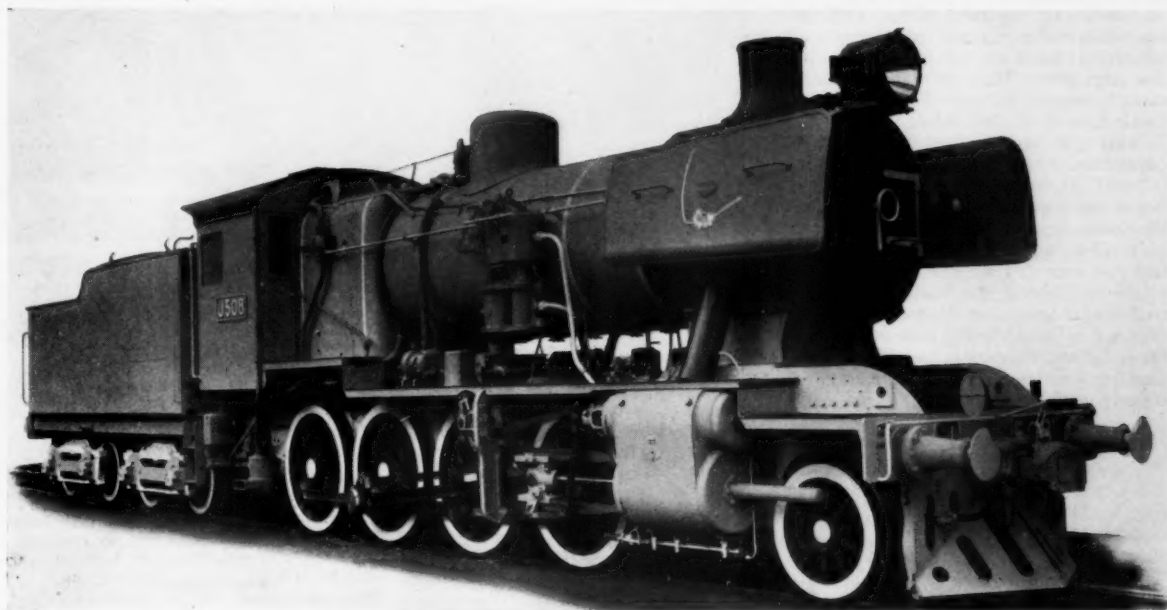
for the 5-ft. 3-in. gauge, they can easily be converted to standard gauge should this become necessary later.

### Boiler Design

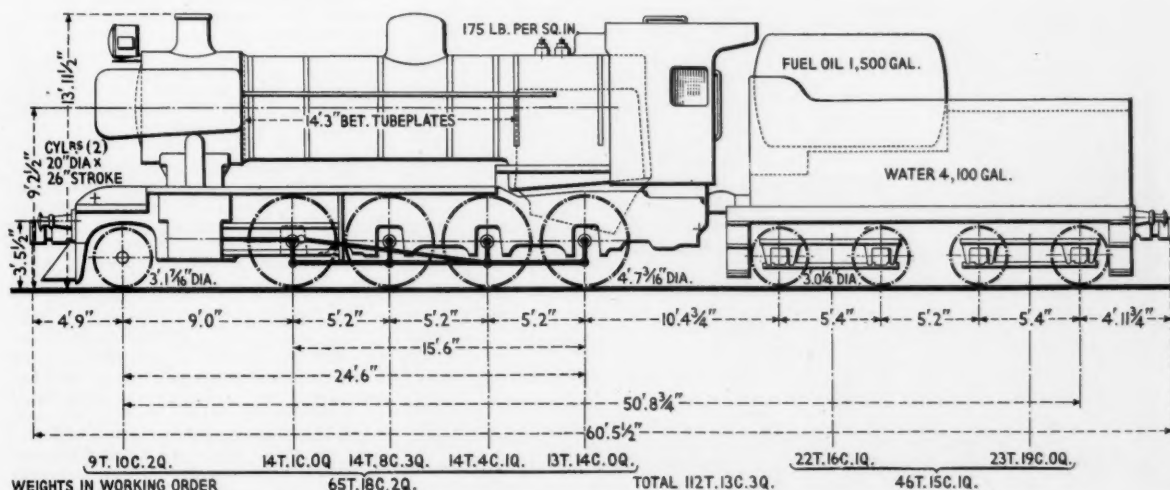
The boiler barrel consists of two courses, and is fitted with a particularly large dome. The firebox is of the Belpaire type, with a welded steel inner firebox fitted with two brick arch tubes. The first two rows of stays are of the sling type, being connected to the outer wrapper by tees and angle bars.

Flannery type flexible water space stays are provided in the breaking zones of the throat, sides, and backplate.

The regulator is of the railways balanced type, operated from a handle on the left-hand side of the cab. The superheater is of the M.L.S. type supplied by the Superheater Co. Ltd. The superheater elements are shortened 1 ft. 8 in. in the case of the oil-fired engines, to give a distance from the return bend to the firebox tubeplate of approximately three feet. The



*Victorian Railways coal-fired locomotive built by the Vulcan Foundry Limited*



*Diagram of principal weights and dimensions of the oil-burning locomotive*

superheater surface of the coal and oil-fired burners is 238 and 218 sq. ft. respectively.

On the coal-fired engines, the fire-grate is of the Hulsan pattern, the ashpan being of the double hopper type, with cast-steel bottom sliding doors, operated by an air cylinder. Damper doors are fitted along each top side of the ashpan. For the oil-fired engines a shallow flame pan is provided, with a single oil burner at the front end. Air is supplied through a damper door in the bottom of the flame pan, and also through short tubes passing through the firebrick linings in each of the sloping sides. The smokebox is fitted with a self-cleaning spark arrestor; the boiler and firebox are completely lagged with asbestos.

Boiler mountings include two Davies & Metcalfe Limited, Nathan type, No. 9 non-lifting injectors, fitted one on each side under the cab platform, and supplying water to the boiler through the clackboxes fitted behind the dome on the second barrel. There are two Coale type, 3 in. dia. safety valves, two Klinger-type water gauges with a water column on the right-hand side, a Detroit, 0 type, S.F. lubricator for the Westinghouse air compressor, and a 7 in. dia. Bourdon type pressure gauge. Two blow-off cocks located above the foundation ring, one on each side of the firebox, exhausting through mufflers. For the coal-fired engines an Ajax air-operated firedoor is fitted. In the case of the oil-fired locomotives extra equipment includes a 4-in. dia. pressure gauge and a steam manifold.

#### Engine Frames

The engine frames are made from 1-in. thick steel plates extending the full length of the engine bed, stayed by steel castings and fabricated vertical stretchers. Side buffers are fitted at the front of the engine, and distance pieces are provided under the buffers to maintain the proper relation between buffers and couplers during the transition period. An automatic Alliance coupler is fitted, and a transition screw coupling provided.

The bearing springs are underhung, and compensation is provided in two groups, the front group includes the truck and leading coupled, and the rear group, the intermediate, driving and trailing coupled wheels. The coupled axleboxes are of cast steel, with gunmetal bearings, whitmetal lined. Lubrication is provided by oil wells in the top of the axlebox. Hub liners of Mintex are fitted. Axlebox guides are of cast steel, fitted with phosphor-bronze liners and wedges. Coupled wheels have wheel centres of the SCOA-P type.

#### Cylinders and Motion

Cast-iron cylinders 20 in. dia. by 26 in. stroke are fitted, the front cover being provided with a piston tail rod cover fitted with a phosphor bronze bush. The hind cylinder cover and the steam chest are arranged to accommo-

date King type metallic packings made by the United States Metallic Packing Company, Bradford. The piston is built up with a forged steel centre and a cast-iron bull ring, secured by rivets, and fitted with two rings. Cylinder lubrication is provided by a six-feed, type DV-2 mechanical lubricator supplied by the Nathan Manufacturing Company, U.S.A.; cylinder cocks are steam operated.

The Alligator type crossheads are of cast steel, the slippers being lined with whitmetal. Connecting rods are provided with adjustable bearings at both the small and big ends, the big ends are lined with whitmetal, and the coupling rods are fitted with gunmetal bushes with whitmetal inserts. Pennsylvania type piston valves of 10 in. dia. are fitted, and are actuated by Walschaerts valve gear, which is operated by a screw reverse gear.

The leading truck is of the swing-link type and has cast-steel axleboxes with gunmetal bearings, whitmetal lined, Mintex hub liners are also fitted.

#### Brake Equipment

Westinghouse brake equipment type A-6-ET is provided. This includes a 7-in.-80, cross-compound air-compressor, fitted on the left-hand side of the boiler, an A6-P6-2 brake valve in the cab, an A6 distributing valve on the left-hand side platform, a 15-in. dia.  $\times$  6 $\frac{1}{2}$ -in. stroke, vertical type brake cylinder on the engine, and a horizontal 10-in. dia.  $\times$  12-in. stroke brake cylinder on the tender. The brake rigging on the engine is completely compensated.

Sanding is provided at the front of the leading coupled wheels and is air-operated. The engines are equipped with a Flaman type, E5 speed indicator. The cab is the Victorian railway's standard type, and is fitted with padded seats for both the driver and fireman. The 32V. electric lighting equipment is of Pyle-National manufacture, and includes a 20F-451 N. headlight with focussing device, gauge lamps, two marker lamps on the front of the engine, and a backing-up lamp and two marker lamps on the rear of the tender. Current is supplied from a turbo-generator.

#### Tender Design

The tender is carried on two four-wheel bogies fitted with plain bearings, with journals 9 in.  $\times$  4 $\frac{1}{2}$  in. dia. The underframe is a welded structure built up from plates and welded sections, and is fitted at the rear buffer beams with an Alliance automatic coupler, and Gould type 175, friction draft gear. Side buffers are also provided, under which are fitted distance pieces to maintain the proper relation during the transition period, also a transition screw coupling is provided.

The tender tank is welded at all joints with internal cross-stretchers riveted to the tank sides. In the case of the oil-burning locomotives the water tank is modified to accommodate a fully welded cylindrical oil tank with

the oil heater coils and valves. The tank has a capacity of 1,500 gal. The tender water capacity of the coal-burning locomotives is 4,200 gal. and that of the oil-burning locomotives 4,100 gal. Inspection was carried out by A. E. Turner & John Coates Limited. The leading dimensions for the coal-fired locomotives are given in the following table:—

Cylinders (2)	...	...	...	20 in. dia. $\times$ 26 in. stroke
Wheels, dia., coupled	...	...	...	4 ft. 7 $\frac{1}{2}$ in.
Wheels, leading truck	...	...	...	3 ft. 1 $\frac{1}{2}$ in.
Boiler pressure	...	...	...	175 lb./sq. in.
Heating surface:—				
Large tubes	...	...	...	392 sq. ft.
Small tubes	...	...	...	925 sq. ft.
Firebox, including arch tubes	...	...	...	127 sq. ft.
Total evaporative	...	...	...	1,444 sq. ft.
Superheater	...	...	...	238 sq. ft.
Total	...	...	...	1,682 sq. ft.
Grate area	...	...	...	31 sq. ft.
Tractive effort at 85 per cent boiler pressure	...	...	...	28,650 lb.
Adhesive weight	...	...	...	58.4 tons
Factor of adhesion	...	...	...	4.55 tons
Engine weight in working order	...	...	...	67.76 tons
Tender, coal burning locomotives:—				
Water capacity	...	...	...	4,200 gal.
Coal capacity	...	...	...	7 tons
Wheel dia.	...	...	...	3 ft. 0 $\frac{1}{2}$ in.
Weight, loaded	...	...	...	45.3 tons
Weight of engine and tender in working order	...	...	...	113.1 tons

The leading dimensions for the oil-fired locomotives are the same as for the coal-fired locomotives but with the following exceptions:—

Heating surface:—				
Superheater	...	...	...	218 sq. ft.
Total	...	...	...	1,662 sq. ft.
Adhesive weight	...	...	...	56.4 tons
Factor of adhesion	...	...	...	4.4 tons
Engine weight in working order	...	...	...	65.9 tons
Tender, oil burning locomotives:—				
Water capacity	...	...	...	4,100 gal.
Oil fuel capacity	...	...	...	1,500 gal.
Weight, loaded	...	...	...	46.75 tons
Weight of engine and tender in working order	...	...	...	112.7 tons

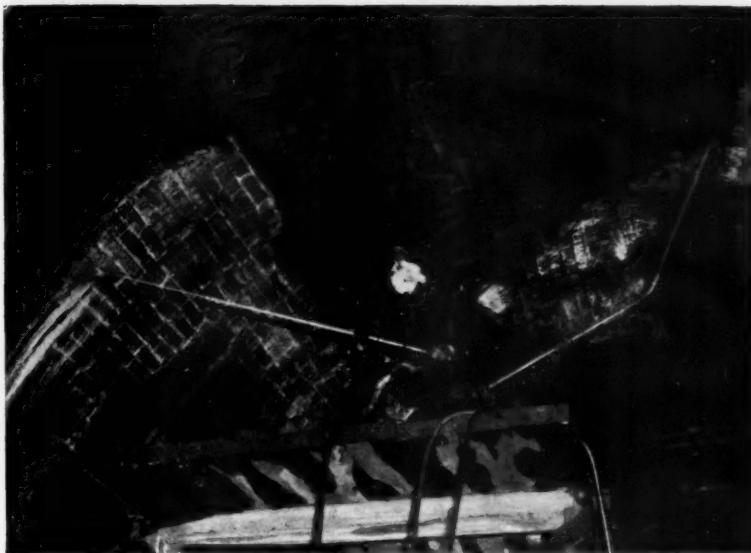
**VISUAL INSPECTION EQUIPMENT.**—Two specialised units for use in the field of visual inspection of engineering components have been developed by Engineering Developments (England) Limited. The E.D.M. 105, an illuminated magnifier, has been developed for the examination of precision parts of internal combustion engines, motor components and so on. The E.D.M. 400 range of probe illuminators has been developed for use in power stations and by manufacturing firms on heavier equipment for the examination of turbine blading, in what are normally inaccessible positions such as the lower half of split stators. It is said that the equipment is in use at Poole, Battersea, Fulham, and Barking power stations.

**DAVEY, PAXMAN & CO. LTD. AT THE BRITISH TRADE FAIR, BAGHDAD.**—Davey, Paxman & Co. Ltd. will be exhibiting at the British Trade Fair in Baghdad a 1-in. to 1-ft. scale model of one of the diesel-hydraulic locomotives supplied to the Mauritius Railway, built by the North British Locomotive Co. Ltd. and powered by a Paxman 12RPHX Series II engine, rated at 625 b.h.p. at 1,250 r.p.m. The model shows full external details; to enable details of the prime mover to be clearly seen, the near side doors of the locomotive have been made detachable and the inside of the casing is electrically wired to throw additional light on the engine. All relative chassis detail has been included (correct coupling rods, buffers, couplings and so on) and the driver's cab is shown complete with control panels.



## New Method of Pointing Brick Lined Tunnels—1

*Use of foamed mortar under pressure to speed up repair work in the Western Region*



*Brickwork being cleaned down by high-pressure jets of water from two lances*

**M**UCH repair work to tunnel linings, and especially re-pointing, with difficulties in obtaining labour and arranging track occupations necessitated the development of a method which would be economical in men and time. Particularly has this been desirable in the Severn Tunnel, where, both from the physical characteristics of the tunnel and the very heavy traffic which it accommodates, general conditions are severe.

The problem resolved itself into two parts: the mechanical cleaning down and preparation of the brickwork (raking of joints, and so on) and the mechanical application of fresh mortar in the joints. The apparently obvious alternative to repairing brickwork joints, i.e., the provision of an overall cladding by guniting to some 2-3 in. thickness is not favoured in the Western Region for various reasons; the main one is the tendency after some years for the gunite facing to come away from the brickwork behind it, the first symptoms being the development of drummy patches which are noted during tunnel inspection.

The method adopted in the Western Region of repointing at high speed by using foamed mortar was exhibited by Mr. M. G. R. Smith, Civil Engineer, Western Region, at the Institution of Civil Engineers' Conversation on June 24, reference to which was made in our issue of July 2.

### **Cleaning the Brickwork**

As to cleaning down, a number of alternatives present themselves. It might be possible to clean brickwork

by developing a machine to imitate the scraping action usually associated with this operation, such as the use of rotating stiff wire brushes; it might also be possible to use sand blasting in dislodging the accumulation of soot mixed with oil which is found deposited, and so on.

All these methods, however, would require development of special machines, the cost of which would have to be borne during the short periods of work over which they would operate. It was therefore soon apparent that attention should be directed towards existing plant which could be

adapted and it was decided finally to try the pump attachment to the Allen Scythe, of which a number are available in each district.

An old welding nozzle was attached to a lance, connected via high-pressure hosing to the pump; the nozzle was drilled out to progressively greater apertures. It has been found that  $\frac{1}{4}$  in. is the most suitable diameter. To the water which is fed to the pump from tanks and is the cleaning medium, is added Lissapol in the proportion of 2½ per cent by volume.

It is found that the high-pressure jet from this lance is amply sufficient to dislodge all dirt from the lining: it is indeed sufficient to wash out most of the deteriorated mortar from the joints and it is a frequent occurrence to observe the stream of water entering an open joint travelling between two or more rings of brickwork and emerging from other open joints carrying with it the soft old mortar. The average time for cleaning down one sq. yd. of brickwork with one jet is approximately 1½ min.

The success of this method is such that it has now been decided to try and combine two and four lances to be fed from one special purpose pump and prime mover, the cost being more than offset by the speed and small labour force required to operate the lances.

### **Aerated Mortar**

Attention simultaneously was given to the problem of mechanising pointing. Here various alternatives presented themselves and a certain amount of experimentation was carried out. It was found that by far the greatest promise lay in development of the Aerocem method of producing aerated mortar by a special process of mixing.



*Cleaned brickwork being pointed by a foamed grout delivered under pressure to a specially-designed gun*

In this process mortar is foamed in a patent mixer with the objects of increasing the resultant volume and producing variations in other properties such as workability, strength, plasticity, and so on, by the use of a detergent, Teepol 410. The mixer is of the vortexing type consisting of a cylindrical drum of 4½ cu. ft. capacity with a concentrically revolving shaft. Upon the shaft are mounted mixing and foaming blades driving the mix down the shaft and up and around the drum. The mixer is driven by a 3-h.p. Petters petrol engine and mounted on a mobile chassis. It is robust and of simple construction.

As only limited published information is available in connection with foamed mortars, it was felt that some tests should be conducted to show whether a foamed mortar could be relied upon to resist sulphate attack, which is easily seen and is perhaps the most important factor of deterioration of mortar joints in tunnels.

#### Testing Methods

The method of test consisted in casting cylindrical samples of 1½ in. diameter and 8 in. length and partially immersing them in a solution of magnesium sulphate of 24.8 gr./litre strength. This is 40 times the strength of ground water at which it is necessary to take precautions against sulphate attack on concrete and it was used so that accelerated results might be observed quickly.

The variables controlled in these tests were: strength of detergent; type of cement; age of immersion; cement-sand ratio; and water-cement ratio.

As the possible permutations of these variables run into hundreds, they were severely reduced so that a merely quantitative comparison might be obtained. The cement/sand ratios were 1:0, 1:3, and 1:6. Water-cement ratios were 1:1 and 1:2.

The percentages of detergent were 0, 25, 50, and 100 of quantities recommended by the patentees of the process. Cements investigated were Portland cement and sulphate resisting

cement. The times of ageing were 10, 18, and 32 days for Portland and 7, 15, and 29 days for the sulphate resisting cement. Samples were both machine and hand mixed and a total of 32 were tested. Results were collected up to 128 days after immersion of the samples in the solution.

Two types of failure recorded through photographs were: first signs of any deformation—cracks, and so on; and total failure—disintegration of sample. The source of error occurring in the method of preparation of the samples because of variations of placing and tamping in the mould, due to the conditions under which the samples were obtained away from the laboratory, was taken into consideration in assessing results, but everything possible was done to obtain uniformity.

#### Test Results

Allowing for errors the results obtained so far show that:—

1. The presence of the detergent as such does not appear to influence significantly resistance to sulphate attack, although a tendency towards lowered resistance is discernible with increasing percentages of detergent.

2. For sulphate resisting cement the presence of the detergent produces an inclination towards slightly higher resistance to sulphate attack.

3. Ageing definitely improves resistance to sulphates.

4. Richer cement/sand mixes are more resistant.

5. The results of the differing cement/sand and water ratios are too few to be conclusive.

Because of foaming, an increase in workability is directly apparent; this for a given aggregate makes possible a smaller water/cement ratio which in turn produces less bleeding. It is well established that higher resistances to sulphate attack are obtained by dense mortars: where the water/cement ratio, however, cannot be reduced below a certain point, excessive working of the mix is necessary for placing; in this

process capillaries are formed due to the segregation which takes place and these allow free paths of attack to the sulphate carrying waters.

By foaming, therefore, although a less dense mortar is obtained, there is the paradox of higher resistance to chemical attack because of the absence of the capillaries which are avoided through the better workability. American literature ascribes the better resistance to frost action of foamed mortars to precisely the same mechanism, added to the fact that part of the pressures set up on freezing are relieved because of the compressible nature of the structure of these mortars.

The problem of the behaviour of concrete with intentional air entrainment has in the last six or eight years received increasing attention both in this country and in America: in this connection it is interesting to note that the parallel problem of the resistance to sulphate attack of such concretes is being at present investigated at the Road Research Laboratory.

As far as can be ascertained from the tests carried out, there does not appear to be any evidence showing that the foamed mortar as obtained by the Aerocem process will behave substantially differently from non-foamed mortar as customarily used for pointing, in so far as resistance to sulphate attack is concerned.

It is felt that the field of this investigation has by no means been exhausted since neither Ciment Fondu nor other cements have been examined, nor properties such as strength, resistance to frost action, and so on. In view of the savings which might be obtained by the placing of foamed mortars by the Aerocem process not only in the case of the pointing of brickwork or masonry—the process is now used in the repair of damage to sea walls on the East Coast after the floods—but also in a number of other fields such as the construction of precast units, claddings of various types, linings of slopes, and so on, it is possible that a full scale investigation might be justifiable.

(To be continued)

**VERNERSBRIDGE STATION TO BE CLOSED.**—The Great Northern Railway Board is stated to have decided on closure of VERNERSBRIDGE Station, on the main line from Belfast to Londonderry, between Portadown and Dungannon. The station, which is not situated near a village or even a main road, has not been used by the public for a long time, though one or two trains stop there daily.

**U.S.A. TRAIN SPEEDS.**—Statistics published in the U.S.A. show that in 1953 2,818 runs, with an aggregate mileage of 151,077, were being made daily on United States railways at speeds of 60 m.p.h. and over from start to stop. If runs are included that are made on certain days in the week only, or the runs to and from Florida which operate in the winter season only, the total is increased to 2,910 runs and 156,094 miles. Of these totals, 250 runs, covering 17,453 miles, are scheduled to be

covered at 70 m.p.h. and over, and 65 (3,626 miles) at 75 m.p.h. and over. Runs booked at over 80 m.p.h. start to stop are found in the timetables of the Chicago, Burlington & Quincy, Illinois Central, Atchison, Topeka & Santa Fe, and Union Pacific companies to a total of 17 (933 miles). Of these the fastest is that of two Burlington "Twin Cities Zephyr" trains in running the 54.6 miles from East Dubuque to Prairie du Chien in 38 min. (86.2 m.p.h.). Two other trains cover the same distance in 40 min., and two more in 41 min. A notable run is that of the Union Pacific "City of Denver," over 95.0 miles from North Platte to Kearney in 71 min. (80.3 m.p.h.). Maximum speeds up to 100 m.p.h. are permitted over certain of these routes. The greatest total of mile-a-minute runs by individual railways is that of the Pennsylvania Railroad, 496 runs of 24,191 miles in length; this is followed by the New York Central System's 22,602 miles (310 runs). Other sub-

stantial figures are those of the Atchison, Topeka & Santa Fe, 17,231 miles (216 runs), the Union Pacific, 12,643 miles (161 runs), and the Burlington 12,090 miles (193 runs). The accelerations of January and April last are likely to add considerably to these figures in 1954.

**PIG IRON AND STEEL PRODUCTION IN JULY.**—Steel production averaged 263,100 tons a week in July, compared with 276,600 tons in July last year and 371,700 tons in June. The fall in output resulted from the interruptions to production at the Steel Company of Wales and to mechanical difficulties at one of the works on the north-east coast. The annual rate equivalent to the average July production is 13,682,000 tons. Pig iron production averaged 211,200 tons a week, which is 22,000 tons less than in June, but is the highest rate reached in July. The equivalent annual rate is 10,984,000 tons.

## RAILWAY NEWS SECTION

## PERSONAL

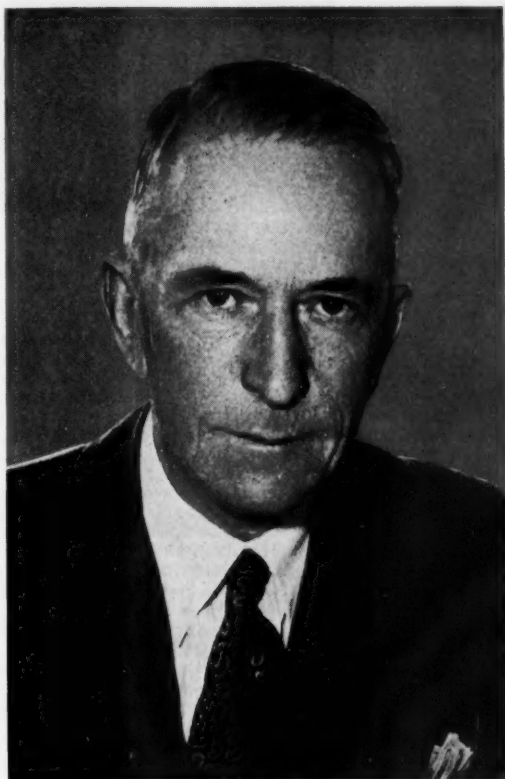
Mr. A. M. Rizk, General Manager of the Egyptian State Railways, now re-designated the Egyptian Republic Railways, has resigned. He will be succeeded by Mr. Gamal el Din Badawi Hamdi, previously Inspector-General, Way & Works.

Mr. Peter John Fahey, A.M.I.E.(Aust.), M.I.R.S.E., M.Inst.T., Signal & Telegraph

Government Railways, Mr. Fahey has been appointed by Metropolitan Vickers—G. R. S. Limited, London, as that company's consulting engineer for Australia.

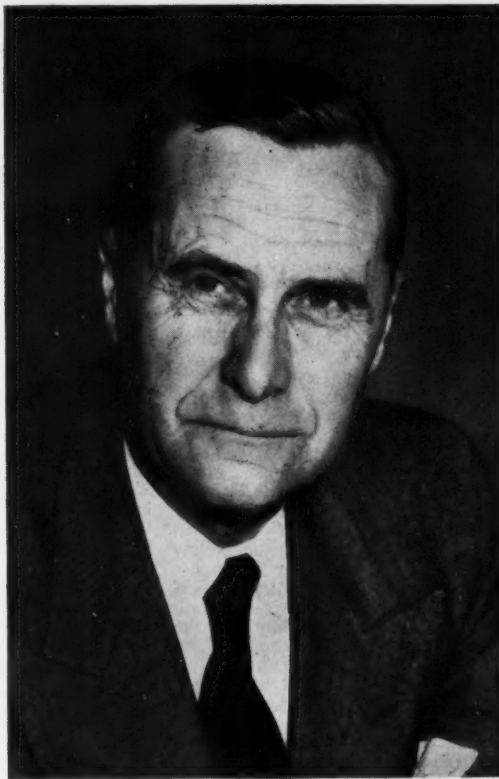
Mr. Donald James Vernon, B.E., A.M.I.E.(Aust.), M.I.R.S.E. Chief Assistant Signal & Telegraph Engineer, New South Wales Government Railways, who, as recorded in our August 13 issue, has been appointed Signal & Telegraph Engineer of

came to the Underground Group from Hadfields Limited, the specialists in the manufacture of cast manganese crossings, bringing to the Underground not only experience gained with that company, but also unusual abilities as a designer. During the past 30 years Mr. Burland has been responsible for the design of most of the major permanent way track work on London Transport's railways. In particular he designed and developed many pieces of permanent



Mr. P. J. Fahey

Signal & Telegraph Engineer, New South Wales Government Railways, who has retired



Mr. D. J. Vernon

Appointed Signal & Telegraph Engineer, New South Wales Government Railways

Engineer, New South Wales Government Railways, who, as recorded in our August 13 issue, retired on July 31, 1954, has completed nearly 49 years of railway service. He entered the Electrical Branch of the Department of Railways in 1905, and in 1909 was engaged on the first power signalling installation in New South Wales. In 1912 he was transferred to the Signalling Branch, and in 1917 he was appointed to the position of Circuit Design Draughtsman. From 1920 to 1929 he was in charge of new works, particularly those associated with power signalling, including the electrification of the Sydney Suburban lines and the City Underground system. Mr. Fahey became Engineer for Power Signalling in 1929, Assistant Signal & Telegraph Engineer in 1943, Chief Assistant Signal & Telegraph Engineer in 1945, and Signal & Telegraph Engineer in September, 1948. In 1952 Mr. Fahey studied modern railway signalling and communication practices in the United States of America. Following his retirement from the New South Wales

the N.S.W. Railways as from August 1, 1954, joined the Signal Branch after graduating from Sydney University. After a period in the drawing office he was transferred to the Electrification Section. There he was engaged on power signalling and throughout the period during which the Sydney Metropolitan lines were electrified and the City Railway was constructed he assisted in the general design work. In 1935 he was appointed New Works Estimating Officer, and, in the following year, was placed in charge of circuit design. While he occupied this position relay interlockings were introduced. In 1949 Mr. Vernon was appointed Assistant Signal & Telegraph Engineer, in 1950 he studied railway signalling in England and on the Continent, and, in 1951, he was appointed Chief Assistant Signal & Telegraph Engineer.

Mr. F. G. Burland, who, as previously recorded, is retiring, has, since 1939, been in charge of the London Transport Executive's Permanent Way Design Section. He

way equipment, starting some years ago with what was known as the "Burland" running rail joint plate (the forerunner of the "Ellson" joint), the modern type block manganese crossing, the unbroken main-line crossing, and the curved switch. He was also responsible for the introduction of movable angles at Baker Street many years ago and, in the wider field of maintenance, developed the technique which is today used for realigning and reconditioning tube tracks.

The Rt. Hon. J. A. Boyd-Carpenter, M.P., Minister of Transport & Civil Aviation, has appointed Mr. O. F. Gingell and Mr. S. M. A. Banister to be his Joint Principal Private Secretaries.

Alderman E. E. Brennan, J.P., and Mr. A. Patton have been appointed to serve for a further period as additional members of the Transport Users' Consultative Committee for the North Eastern Area.





**Mr. J. M. Dharmaratne**

Appointed Divisional Transportation Superintendent, Ceylon Government Railways



**Mr. R. A. Green**

Confirmed Assistant Signal & Telecommunications Engineer, Eastern Region



**Mr. David Hill**

Confirmed District Passenger Superintendent, Leeds, N.E. Region

Mr. J. M. Dharmaratne, B.Sc. (Hons.) (Lond.), A.M.I.Mech.E., Assistant Divisional Transportation Superintendent, Ceylon Government Railways, who, as recorded in our August 6 issue, has been appointed Divisional Transportation Superintendent, was born in 1914, and educated at Mahinda and St. Aloysius' Colleges, Galle, and at the University College, Colombo. He entered the service of the Ceylon Railway in 1939 as a probationary Assistant Divisional Transportation Superintendent under the scheme for training graduates for higher appointments in the service. After a three-year course of training locally in the railway's central workshops at Ratmalana, in locomotive running sheds throughout the system, and in traffic working, he left for India for study and further training for a period of two years with the Great Indian Peninsula Railway. He returned to Ceylon towards the latter part of 1944, when he was appointed Assistant Divisional Transportation Superintendent. In October, 1949, Mr. Dharmaratne was appointed Assistant General Manager (Operating). Since October, 1951, he officiated as Acting Divisional Transportation Superintendent on three occasions until he was confirmed in the position as from April, 1954. Mr. Dharmaratne left Ceylon by sea for the United Kingdom on July 17 this year. He is coming for training in Public Administration under the Colombo Plan Technical Co-operation Scheme, and he will be attached to the Western Region of British Railways for a period.

The following is an extract from the Supplement dated February 23, 1954, to *The London Gazette* of February 19, 1954:—

*Corps of Royal Engineers—A.C.F. Section.*  
Lt. (War Subs. Maj.) C. W. Leverett, M.B.E. (348748) relinquishes his commn. February 24, 1954, and is granted the hon. rank of Lt.-Col.

The Minister of Transport & Civil Aviation has re-appointed Sir Alan Rae Smith, K.B.E., F.C.A., and Sir Harold Barton, F.C.A., to be the auditors of the accounts of the British Transport Commission for the year ending December 31, 1954.

Mr. R. A. Green, M.B.E., E.R.D., A.M.I.E.E., who, as recorded in our August 13 issue, has been confirmed in the position of Assistant Signal & Telecommunications Engineer, Eastern Region, Kings Cross, British Railways, in which position he has been serving in an acting capacity since August, 1952, was educated at King's School, Grantham. He entered railway service in the Telegraph Superintendent's Department of the London & North Eastern Railway at Grantham in 1924, being transferred to the Headquarters Area Drawing Office, Retford, in 1926. Early in 1928, he joined the Headquarters drawing office in London. He was appointed Junior Technical Assistant in 1930 and, later, Senior Draughtsman, and was engaged on the signalling in connection with a number of major new works, including the Gidea Park-Shenfield widening and the Fenchurch Street Station re-modelling. In August, 1939, he was called up from the Regular Army Supplementary Reserve of Officers, Royal Signals. He was attached to the British Army staff in Washington in 1944 to carry out a tour of the U.S.A. Army Signal Corps Training Centres to study their training methods and equipment. After demobilisation in 1946, he was engaged on the re-starting, planning, and staging of the re-signalling work in connection with the Liverpool Street-Shenfield and Manchester-Sheffield-Wath electrification schemes. He was appointed Chief Outdoor Assistant in 1947 and was re-designated Assistant Signal Engineer (Maintenance) in 1950. On re-formation of the Transportation Units, Supplementary Reserve, in 1950, he took command of No. 2 Railway Telegraph Squadron, Royal Signals. He was awarded the M.B.E. in 1945 and the Emergency Reserve Decoration in 1953. Mr. Green is a member of the Council of the Institution of Railway Signal Engineers.

The following have been appointed members of the Transport Users' Consultative Committee (South Western Area):—  
Representing Commerce and Industry: Messrs. N. E. Harper, R. Ayshford-Sanford.  
Representing Local Authorities: Councillors F. G. Wilkins, E. G. Lilley, J.P., and Alderman G. J. Greenslade.  
Additional Member:—Mrs. I. Seed.

Mr. David Hill, Acting District Passenger Superintendent, Leeds, North Eastern Region, British Railways, who, as recorded in our August 6 issue, has been confirmed in that position, was appointed a Traffic Apprentice after service in junior positions in Edinburgh and Glasgow in his early railway career. He received training in operating and commercial departments in the Scottish Area of the L.N.E.R., and subsequently occupied positions in the Goods Manager's Office, Glasgow, including that of Chief Claims Clerk, and Head of the General, Statistical & Traffic Section. In these positions he was a member of many Railway Clearing House Committees and was also Secretary to the L.N.E.R. Goods Managers' conference. In 1945, Mr. Hill was appointed Assistant to Mr. H. F. Sanderson, then Principal of the L.N.E.R. All-Line Commercial School at Faverdale Hall, Darlington; he continued in this position until Faverdale Hall became a Staff Training College in 1950. After a few months on special duties in the Commercial Superintendent's Office, York, he became Assistant District Passenger Superintendent, Newcastle, returning to York Headquarters as Claims Assistant to the Commercial Superintendent in April, 1953. In March, 1954, Mr. Hill became Acting District Passenger Superintendent, Leeds, in which appointment he has now been confirmed.

#### L.M. REGION STAFF CHANGES

The following staff changes are announced by London Midland Region, British Railways:—

Mr. A. T. Payne, District Road Motor Engineer, Blackburn, to be District Road Motor Engineer, Manchester.

Mr. T. W. Royle, Assistant District Operating Superintendent, Burntisland, Scottish Region, to be Assistant District Operating Superintendent, Leicester.

Mr. A. R. Ogley, Assistant to District Operating Superintendent, Doncaster, to be Assistant District Operating Superintendent, Manchester (Eastern Operating Area).

Mr. C. P. Millard, Goods Agent, Portsmouth, to be Assistant District Commercial Superintendent, Derby.

Mr. R. R. Kenderdine has been appointed an Executive Director of Crompton Parkinson Limited.

Mr. G. E. Hughes-Jones has been appointed Manager of the Newcastle office of the Brush Electrical Engineering Co. Ltd.

Mr. J. U. Cooke has been appointed Assistant Export Manager, A.C.V. Sales Limited. He has been associated with the A.C.V. group for eight years.

Mr. W. E. Johnson, head of the research division of Powers-Samas Accounting Machines Limited, has been elected a Director.

We regret to record the death in Calcutta on August 2, in his 54th year, of Mr. W. J. Orange, General Manager for India of the English Electric Co. Ltd.

Mr. G. R. M. Robinson, Outdoor Assistant, Operating Department, Waterloo, Southern Region, British Railways, has been appointed Indoor Assistant, Operating Department, Waterloo.

Mr. D. E. C. Hayes, Managing Director of the Dar-es-Salaam Motor Transport Co. Ltd., and of Kenya Bus Services (Mombasa) Limited, has retired from the board of the African Transport Co. Ltd. for reasons of ill-health.

Mr. J. Forster has been appointed to succeed Mr. G. W. Hayter as General Manager of the Northern General Transport Co. Ltd. on Mr. Hayter's retirement on December 31 next. Mr. Forster is at present General Manager of Trent Motor Traction Co. Ltd.

Mr. W. M. Dravers has been appointed to succeed Mr. P. E. R. Graefe as General Manager of Maidstone & District Motor Services Limited and the company's two subsidiaries when Mr. Graefe retires on December 31 next. Mr. Dravers is at present General Manager of the South Wales Transport Co. Ltd.

Mr. A. S. Woodgate has been appointed to succeed Mr. A. F. R. Carling as General Manager of Southdown Motor Services Limited when Mr. Carling takes up his executive appointment with the British Electric Traction Co. Ltd. on November 1 next. Mr. Woodgate is at present Assistant General Manager of Ribble Motor Services Limited.

Sir Alexander Maxwell, Chairman of the board of British Travel & Holidays Association, has resigned owing to ill-health. His resignation takes effect as from August 21, and Mr. E. L. Taylor, Deputy Chairman, will carry on until a new Chairman is appointed.

Mr. Oliver Lyttelton, the former Colonial Secretary, has been elected a Director and Chairman of Associated Electrical Industries, Sir George Bailey having resigned the chairmanship, while remaining a Director. Mr. Lyttelton was made a viscount after resigning recently as Colonial Secretary.

Mr. L. R. Sargent has been appointed Plant Engineer at the Chelmsford Works of Marconi's Wireless Telegraph Co. Ltd., in succession to Mr. R. Sargent, who has reached the retiring age but is continuing his service with the company in the capacity of Assistant to the Works Manager.

## Recruiting Staff for South African Railways

The shortage of staff on the South African Railways is reported as being relieved by immigrant workers.

A railway recruiting mission at present in Europe, recently sent 193 young men from Holland and Germany to the Union after considering several thousand applicants. Another 200 were expected to arrive last month.

At the end of 1953 there was stated to be a shortage of 1,400 trainee firemen, 2,000 trainee shunters, and 200 platelayers. The decision to send a mission overseas was taken after an attempt to recruit the necessary staff in the Union had failed.

The mission, which is headed by Dr. J. van Heerden, of the Railway College at Esselen Park, has its permanent headquarters in Cologne. The recruiting campaign which began in February has so far been confined to Germany, Holland, and Belgium, but a drive will soon be started in England.

The Austrian and Italian Governments are said to desire the mission to visit their countries, but it has not yet been decided whether it will be necessary to recruit there. The mission will probably be in Europe for at least another 11-12 months.

## Callender-Hamilton Bridges for Norwegian State Railways

Despite keen continental competition, British Insulated Callender's Construction Co. Ltd. has obtained from the Norwegian State Railways an order for three Callender-Hamilton railway bridges of 190-ft. span.

Hot dip galvanising of all steelwork, a process used with great success on Callender-Hamilton road bridges, is to be applied to their railway bridges for the first time and its use is expected to cut maintenance costs to a low figure.

The bridges are to be of the same standard construction as those in use in Holland since 1946, when many spans up

to 286 ft. long were ordered by the Netherlands Railways for reinstatement of main line crossings of waterways.

### Use of Standard Sections

The Callender-Hamilton railway bridge is of the unit-construction type; it was designed originally for emergency use in India, but is being used increasingly as a permanent structure. One advantage claimed is that it allows spans of any length to be constructed from a number of standard sections. The order for Norway includes the supply of additional sections to provide for any variation of span length that may be required.

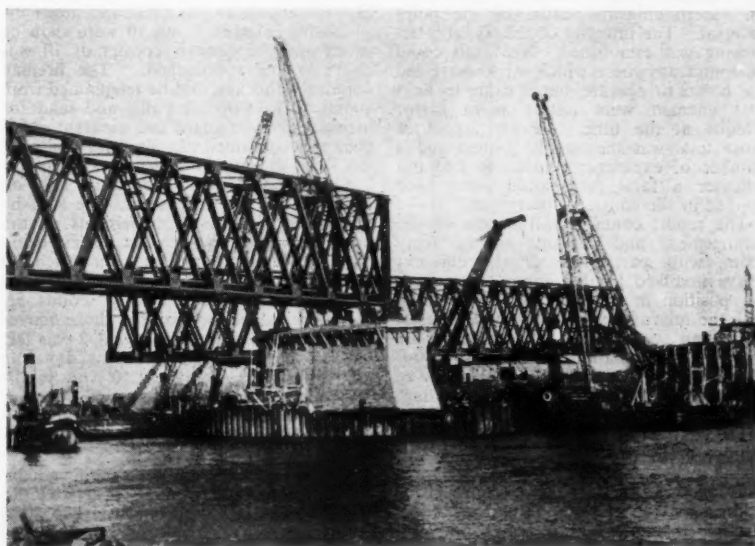
Fabrication and galvanising of the steelwork is being carried out by Tees-side Bridge & Engineering Works Limited, Middlesbrough.

## Conversion to Single Line in France

As the result of the reduction of traffic on certain secondary lines, the S.N.C.F. has been converting many from double to single line. Between 1938 and 1950 double-track mileage was reduced from nearly 13,000 to some 11,000; a further programme for the conversion of more than 1,350 miles of double-track line is in hand.

This programme, begun in 1952, is proving particularly remunerative, the conversion expenses being covered in less than a year by the economy in maintenance costs alone. The S.N.C.F. intends to pay particular attention to the possibility of such conversions when track renewals are due.

A. G. WILD & CO. LTD. LONDON OFFICE.—A. G. Wild & Co. Ltd., of Sheffield, manufacturers and designers of railway coach fittings and of colliery equipment, have opened a new London office at 7, Victoria Street, London, S.W.1. It will be under the management of Mr. B. G. V. Forman. The telephone number is Abbey 6761.



Two 240 ft. spans of type D Callender-Hamilton railway bridge being moved into position at Mook, Holland. The spans to be used in Norway are similar in design

## Ministry of Transport Accident Report

*Bethnal Green, September 4, 1953 :  
British Railways, Eastern Region*

Brigadier C. A. Langley, Inspecting Officer of Railways, Ministry of Transport & Civil Aviation, inquired into the accident which occurred at 2.26 p.m. on September 4, 1953, at Bethnal Green, when the 2.21 p.m. express Liverpool Street to Ipswich, consisting of ten bogie coaches drawn by a 4-6-0 type engine, running under clear signals at about 20 m.p.h. on a 1 in 70 up gradient, became derailed in consequence of a pair of electrically operated facing points moving between the bogies of the first coach, with the result that it was carried broadside on, struck the station platform and became crushed against an anchoring structure carrying the traction wires.

The second coach and the leading bogie of the third also left the rails. The four passengers in the leading coach escaped without serious injury. Nobody else was hurt. Assistance was speedily forthcoming and all casualties were cleared by 2.45. The main and suburban lines were blocked, but through working was still possible on the electric lines.

The suburban lines were cleared by midnight and the main by 2.50 a.m. the following morning. The accompanying diagram shows the lines, signals, and so on essential to an understanding of the case.

### Signalling Arrangements

This area is track circuited throughout and has four-aspect colour-light signals. The signalbox has a panel route relay interlocking apparatus. The approach locking on the through routes extends back to the first warning signal in the rear. Main and electric lines are equipped for operation on the 1,500-V. d.c. system.

Points 53, at the trailing end of the crossover concerned, were run through, and 52 point machine, which operates not only the facing points but also the facing end of the parallel crossover, up suburban to up main, was destroyed. Another point machine and a number of signal cables and so on were damaged.

Attention was immediately concentrated on ascertaining the cause of the point reversal. The integrity of the signal interlocking was established. No faults could be found anywhere which might have led the points to operate, but it came to light that linemen were testing point motor circuits at the time. Every aspect of those tests was thoroughly probed and a number of experiments made to find out whether a false feed could have been applied in the course of that work.

The report contains full details of the arrangement and contents of the relay room, with particulars of the different relays involved in the circuits concerned, the position in which they are mounted, with the relevant terminal and fuse boards, links, and so on, types of electric power provided for signalling, and a description of the electric traction equipment power supply and distribution, feeders, bonding, and so on.

The control relay for 52 points has three sources of power, namely the a.c. 110V. supply, which energises the point detection relay circuits, the 110-V. d.c. supply providing power to the point machines through the operating contacts and the 24-V d.c. circuits which energise the point control relay coils themselves, through the various interlocking and track circuit relays.

The point machine concerned is in the 6-ft. way. The down main points are worked by rodding, operating also the facing point lock and detector at that end of the crossover. Power is carried in a multicore cable from the terminal board in the relay room to a location case nearby and then through another cable to the machine. The operating sequence is: (a) the lockbar moves half travel to unlock the points; (b) the point throw bar moves full travel to move them over and (c) the lockbar completes its travel in the same direction to lock the points in their new position. Each stage takes approximately one second. The mechanism is brought to rest without shock through a snubbing circuit. Two pole-changer coils, one for "normal," the other for "reverse" operation, are fitted so as to reverse the motor circuits when this becomes necessary. Power needed to operate the two pairs of facing points from one machine is approximately 4 amps. at 100 V. No. 52 points are set or held and locked "normal" by the operation of one of six route switches on the panel apparatus, and "reverse" by one of two others. The conditions under which points can be operated, if exceptionally necessary, by their individual switches together with the relevant track, approach, and backlocking controls, are detailed in the report. Once signal No. 8 has been cleared points 52 cannot be released, as far as a movement along the down main is concerned, until a track circuit extending from the fouling point of crossover 50 to the London end of the platform has been occupied and cleared. A two-minute time release covers re-routing.

### Course of Events: Evidence

The driver of the Ipswich train said that, after travelling normally from Liverpool Street, he was running at about 20 to 25 m.p.h. when he felt a heavy pull as he reached the platform. He then saw the leading coach had hit the overhead structure. The tender coupling parted and the engine stopped halfway down the platform. Signals 8 and 10 were showing green and the banner repeater of 10 was "off" as he approached. The fireman confirmed this and said he telephoned from signal 10 to stop all traffic and send for assistance. The guard and assistant guard generally confirmed this also and explained the steps they took.

The signalman could throw no light on the cause of the derailment. He said he dealt with a series of movements on the down suburban line, the last to pass being the 2.18 p.m. to Chingford, after which the 2.24 to Yarmouth was described but did not arrive before the accident. Points 51, 53, 55 remained normal for those movements and the switch for signal 2 was left set for the through route. This signal is semi-automatic. After the 1.50 p.m. South-end train passed at 1.54 he set the junction at the down end of the station—points 61—for the Cambridge parcels train which cleared the station at 2 p.m.

The next down main movement was the express involved but before it arrived the 1.58 train from Chingford was described on the up fast and the signalman set its route to the up suburban platform, which restored points 61 to normal automatically. This train passed at 2.23. At about this time the express was described. The

switch for signal 8 was already in the "off" position and he operated those for signal 10 and the next in advance. He did not see the train approaching but received a "not described" indication on the up suburban instrument. He stopped the bell set ringing and noticed certain track circuits on the suburban lines were shown as occupied as well as those on the down main and that the detection of points 52, 53, 55 had become lost. Looking along the platform and seeing a cloud of dust he realised there had been an accident, sent "obstruction danger" and restored all signal switches to neutral. The express fireman then rang up.

The signalman sent for the linemen who asked what had happened, checked the position of the panel switches and returned to the relay room. No defect could be found on the engine and coaches of the express which could have affected 52 points. The stock of the train from Chingford also was thoroughly examined but nothing was found amiss, or with any of the other local trains which passed over that line. A check of engine repair cards revealed no defect which could have a bearing on possible damage to the point machine.

The signalman explained that the four crossovers at the London end of the station were seldom used; no trains were booked to run via them. He did not recollect having to touch 52 points during the previous week. Signal switches concerned were normally left set for their respective routes, and turned to neutral only when one of the crossovers had to be used. It was possible to "pre-select" a route but it was never done. He had no occasion to use 52 crossover on the day of the accident and was not moving any other points at the time. (Inquiries established that 52 points had been last used four days previously for a light engine.)

### Track and Signal Equipment

The permanent way inspector found 52 points reversed and the track damaged. The ganger said that on the previous afternoon he had been opening two beds of ballast at those points in preparation for relaying two stock rails. The ballast was loose and his men only required shovels to open it out between sleepers. The points were, to his recollection,  $\frac{1}{8}$  in. slack to gauge but fitted perfectly, normal and reverse.

The Area Signal & Telecommunications Assistant arrived about 3 p.m. and found points 52 locked reverse. The machine had been smashed but was no doubt in the full reverse position with the lock thrown. Trailing points 53 had been run through. All signal switches and individual point switches on the signalbox panel were at neutral. The condition of the down main describer indicated that the track circuits had become occupied necessary to transmit forward to Mile End, which requires points 52 normal. The controls for the points in the relay room were examined. The point control relay and both 52 points and 8 signal interlocking relays also were normal, with 52 and 53 point indicator relays de-energised. All glass panels protecting the point control relays were in position with wing nuts properly screwed on.

A lineman, 15 years in that grade, at Bethnal Green since October, 1948, said he arrived at 1.50 and was met by an assistant lineman—appointed in 1947 and at Bethnal Green since June, 1949—who expressed con-



cern at having found an earth on the negative of the 110 V.-d.c. circuit. His voltmeter showed 100 V. and his test lamp was full alight. The lineman tested with his lamp, with like results. This was done at the fuse bars, and on being continued at the power supply panel, where it was normal to make such a test, gave the same results. Leaving the voltmeter and lamp connected to the positive busbar the lineman began, he said, searching for the negative side fault. He disconnected certain terminals and withdrew eight fuses from the d.c. fuse panel, but the lamp continued to burn brilliantly.

### Check of Wiring

They examined the wiring diagrams before making further tests. The assistant left the relay room, and the lineman decided to check the position of the links on the terminal boards assembly; he began with the board carrying the terminals from points 50. He had to stretch up and turn labels and had a lighted wander lamp with metal guard under an arm.

He could not recollect any flash or shock but something made him drop the lamp; he did not appreciate its significance for some days, when he realised the lamp guard must have been very close to 52 points operating terminals on the next board. Consequently he did not give this evidence at the special railway enquiry; it came to light only after the signalling equipment had been tested. He did not attempt to draw any terminal links and had not yet made up his mind to it. It was the first time he had had to deal with such a fault.

He spent several minutes looking at the terminals on one of the boards but did not check any other. He went back to the diagrams intending to list all point operating terminal positions. He thought he was still at them when the accident occurred.

He found 52 points interlocking and control relays normal and 52 and 53 detection relays de-energised, and examined 52 points. He admitted later to having met the assistant lineman again in the relay room, whom he told they would have to take off protecting covers to relays on one of the racks to look for the negative fault; he had asked him to remove one but, on returning, told him to replace it at once.

To trace a fault on the negative side of the 110-V. d.c. circuit he would have to draw links on the terminal board and disconnect some terminals on a busbar.

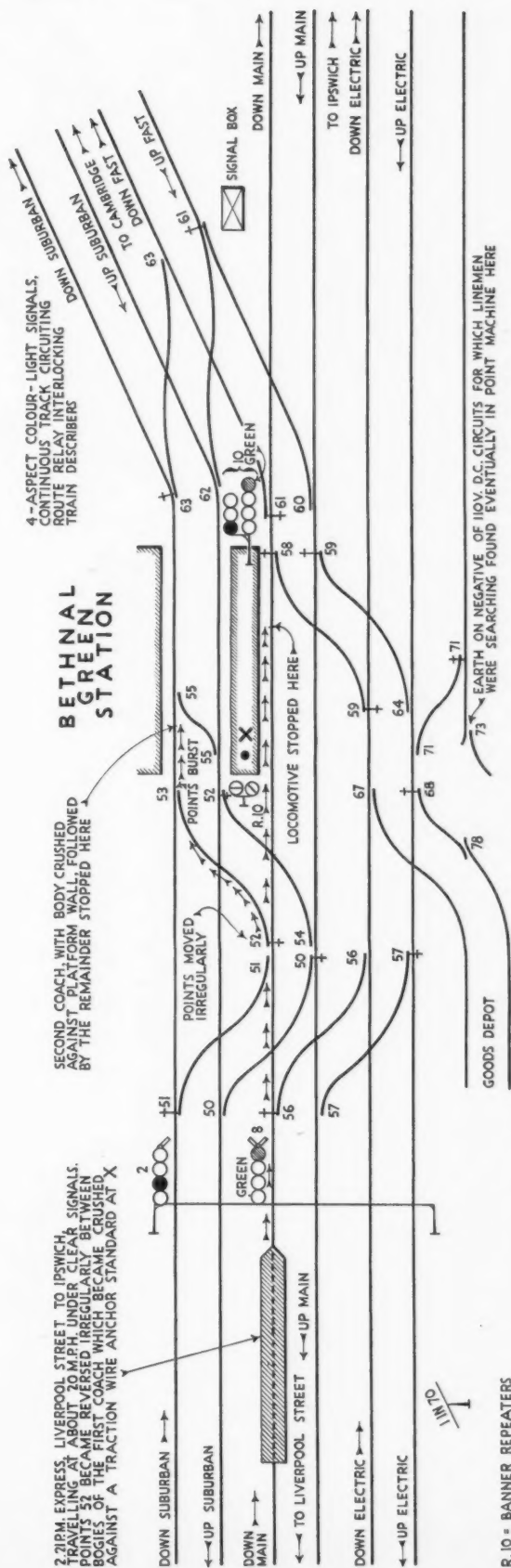
The assistant lineman had difficulty in remembering what he was doing during the critical period just before the accident. His evidence was not clear on some points.

He demonstrated on a model how he would test for a negative fault, drawing back links in turn; he let one slip and touch the one below. Very occasionally, he said, he found link terminal nuts loose. The last he remembered was six to eight months previously at Mile End, with different equipment.

Another signal lineman demonstrated to Brigadier Langley how he would draw terminal links; originally he had experienced difficulty with the edge of one catching on the under nut of the terminal, but overcame it by holding the link in the middle. He also allowed it to slip and touch the one below.

### Testing of Signalling Equipment

Very comprehensive tests were made to ascertain whether any false feed could have been applied to 52 point machine through the signalling equipment. No



*Diagram showing circumstances of accident at Bethnal Green, British Railways, Eastern Region, September 4, 1953*

R.10 = BANNER REPEATERS

defect was found in the circuits to it. Insulation resistance was satisfactory. The machine was carefully examined but nothing found wrong with it not attributable to the damage it received. There was a small leakage from the case to the return traction circuit path but the motor itself was properly insulated from the case.

Testing the internal wiring gave like results; there was no leakage between the 110-V. d.c. circuits operating the points and the 24-V. d.c. supply operating the relays. All relevant relays were carefully examined for metallic objects or loose wires, but everything was in order.

The detachable tops of 52 interlocking and appropriate panel key repeat relays were removed; nothing amiss with the contacts was found. The plugs on the ends of the leads used for testing the relays showed no burning by short circuit, but such is virtually impossible when testing normally the 24 V. d.c. or 110 V. a.c. relay systems. All relevant track circuits were working satisfactorily.

The fault the lineman was looking for was traced to 73 point machine. The negative lead to the normal pole changer had become trapped between the terminal block and casing. This fault was then deliberately made, false earths applied at various places on the adjoining 71 machine and machine 73 operated, but at no time did 71 motor begin to move. The insulation of every point machine was thoroughly tested in every detail but only minor leakages on pole changer coils found in one or two places. None could have had any effect on point operation; only negligible current could have passed to earth.

Experiments were made before Brigadier Langley to see the effect of touching certain terminal links with the wander lamp. In all but one case arcing, flashing, and burns occurred, and fuses blew. The snubbing contacts in the point control circuits provided a short circuit to negative. In no case did 52 machine move and maximum voltage there was five. Arcing was so severe that the lineman must have noticed it, provided all terminals were then properly connected.

Such a false feed could be ruled out, but current could reach 52 points if a particular link were withdrawn and touched the one below, while with a certain terminal loosened, so that the link was out of contact, current could reach the motor if the lamp touched the companion terminal and the link below. The report gives details of how this was done during tests and the path taken by the current.

The possibility of getting a false feed by cross connecting the point control relay terminals was investigated as the lineman had spoken of intending to remove covers. No mere contact was effective, but had the relay been unlatched by touching it then a false feed could have been obtained by touching certain terminals, with say, the wander lamp. There would then be no snubbing cross protection.

#### Tests of Traction Equipment

Exhaustive tests were made to establish whether leakage from the traction system could have caused 52 points to operate. The equipment was checked on the night of the accident and a detailed examination made two days later. Insulation of the transformer and capacitors was satisfactory, and the automatic earthing contactor operated and indicated back correctly. Potential between running rails and earth was 25 V. at Bethnal Green sub-station

and 12 at Liverpool Street—as directly after the accident—with earth positive and running rails negative. Lowest insulation of overhead equipment to earth was 50,000 ohms and the highest 300,000 with no insulator cleaned.

The insulation at any one point must have been about 6 million ohms and leakage over each insulator 0.00025 amps. The insulation of the 1,500-V. feeders varied from 30 megohms to infinity. Maximum reading between sub-station neutral (running rails) and earth was 25 V. with load there of 2,400 amp. and voltage drop in the rails between 52 points and sub-station averaged 0.27 V. per 100 amp. Had the point machine been connected directly between the rails at the points and those at the sub-station, a 37,000-amp. traction current would have been needed to produce the 100 V. necessary to work it.

To pick that up the motor equipment would have to be connected in shunt between two points on the return circuit, voltage being dependent on the distance between the two. Had the second connection been at 73 points, where the negative fault eventually was found, instead of at the substation, voltage drop would have been negligible. A current of 37,000 amp. is beyond the total output of the rectifiers and in any case the circuit breakers would have come out at 4,500 amp., a maximum of 9,000 per section. There was, however, only one train moving, with maximum current of 1,200 amp.

#### Review of Evidence

After reviewing in detail the evidence and tests, Brigadier Langley observes that there were two places where cross connections could have produced a false feed, at the 52 points control relay and on a terminal board. There was no positive evidence that either was touched. It is very doubtful, however, whether the false feed was applied at the control relay, as it was found properly latched normal. The lineman's evidence suggested he might have touched some links with the lamp. This would have required a terminal so loose as to make no contact, which could have happened had the nuts been left loose after cleaning and testing, but nothing in the log book showed anyone had worked on the boards after August 31, the last day 52 points were operated.

It is possible that a slipped link caused the trouble. It is easy to let one slip and touch the one below, as unintentionally twice demonstrated. The man concerned denied having drawn a link back, the quickest way to find the fault. He tried to give the impression that he spent most of his time examining diagrams and formulating a course of action. He is, however, experienced and Brigadier Langley finds it difficult to believe he did not know how to trace it. He had found one a fortnight earlier.

#### Inspecting Officer's Conclusion

The points were reversed irregularly from a false feed; no doubt the lineman inadvertently touched the links with his lamp, with a terminal loosened or, more probably, allowed a link to slip and touch the one below.

#### Remarks

Although the accident was due primarily to a lineman's mistake, some of his equipment was not entirely satisfactory. Wander lamps with uninsulated wire guards should never be allowed at such places and all in the Eastern Region have now properly insulated guards.

The type of link in use here and one or two other Eastern Region signalboxes is obsolescent. It is being replaced by one with a tough fibre extension in the shape of a slot embracing the terminal when the link is shifted, ensuring that it cannot make contact with adjacent terminals. Some of the point machine pole changer coils were not up to standard for insulation. This had no particular effect on this occasion, but breakdown of point machine insulation is a serious matter and all defective coils were being replaced.

Electrical signalling equipment is so designed that defects and mistakes in operation normally lead to safety side failures. Most meticulous care is taken to check the integrity of the interlocking and controls before new works are brought into use. This, with a high standard of maintenance, has produced an excellent safety record. Accidents due to failure or misuse of apparatus have been very rare. Circumstances revealed at Bethnal Green show further improvements to be needed to guard against carelessness in testing. It is recommended to extend the action taken to other installations where similar equipment is installed.

Another derailment occurred at Thirsk on January 20, 1954, due to irregular operation of electrically worked points, but from a different cause. The coincidence of these failures has led to a thorough investigation to see whether present safeguards can be improved. Neither case, however, was attributable to the working of the panel, or of any of the route relay interlocking equipment.

## Staff & Labour Matters

### Railway Wages

Renewed talks between the B.T.C. and the three railway unions on the revised wages structure ended without agreement after five hours on August 13.

The executive of the A.S.L.E.F., which met on August 17, has decided to continue negotiations and asks that the question should be referred to the Railway Staff National Council, on which representatives of the B.T.C. and of the three railway unions sit. The executive committee has decided to press its claims through the negotiating machinery.

The N.U.R. executive committee was due to consider the position on August 12, and the T.S.S.A. executive was to meet later in the week to discuss the matter.

Longsight No. 1 Branch of the N.U.R. passed a resolution last Sunday asking the Manchester District Council of the union to convene a delegate meeting within seven days. Birmingham footplate men have called for a national railway strike on September 25 if the demands of the A.S.L.E.F. are not met by that time.

**EGYPTIAN REPUBLIC RAILWAYS LONDON REPRESENTATION.**—The London office of the Chief Inspecting Engineer, Egyptian Republic Railways has been closed. Matters requiring attention in London may, it is stated, be referred to the Egyptian Embassy, 75, South Audley Street, S.W.1 (telephone Grosvenor 2401).

**INSTITUTE OF FUEL: INAUGURAL CONFERENCE.**—The inaugural conference of the Institute of Fuel for the special study of removal and recovery of sulphur from fuels will be held at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1, on October 6 and 7.

## Contracts & Tenders

The North British Locomotive Co. Ltd. has received a further order from the Sudan Government for 20 4-8-2 steam locomotives of 3 ft. 6 in. gauge, for the Sudan Railways. These are similar to the locomotives which the firm is now supplying under a previous order.

The following contracts have been placed by British Railways, Scottish Region:—

Webster Bannerman & Co. Ltd., Glasgow: renewal of concrete floor of locomotive shed at Eastfield Motive Power Depot, Glasgow

G. R. Haden & Sons Ltd., Glasgow: provision and installation of heating and domestic hot water heaters at office accommodation 45 Hope Street, Glasgow

Robertson Thain Limited, Glasgow: renewal of roof at Cowlares Works, Blacksmith's and Fitting Shop

A £1,700,000 order for the supply of paper-insulated cable and wire for the Soviet Union has been placed with Crompton Parkinson Limited. Deliveries will be spread over two months, and the equipment used to carry electric current for transport.

The Director General for Supplies & Disposals, New Delhi, invites tenders as follows:—

- (a) 24 axlebox bodies 6 in.  $\times$  3½ in. N.G.
- (b) 12 axlebox bodies 7 in.  $\times$  3½ in. N.G. (DGS & D No. 9832)
- (c) 12 axlebox bodies 7 in.  $\times$  3½ in. N.G. (DGS & D No. 9831)
- (d) 280 liners for tender bogies, Salvabestos
- (e) 100 bushes, bronze, for rod, coupling, leading and trailing
- (f) 74 pairs brakes, for CHKM (DGS & D No. 3173)

Tenders, quoting the following references, will be received up to 10 a.m. on (a), (b), (c), (d) August 26; (e), (f) September 6. (a), (b), (c) SRI/16586—E/1 (d) SRI/16617—E/1 (e), (f) SRI/16592—E/IV.

Forms of tender are only available for purchase in India from the Deputy Director General (Supplies), Directorate General of Supplies & Disposals, New Delhi; Director of Supplies & Disposals, Bombay or Calcutta; Deputy Director of Supplies & Disposals, Madras.

If the date for the receipt of tenders does not allow sufficient time for tenderers to obtain tender forms from India, they may submit their quotation to India in their own letter form or by telegram so long as all essential particulars are given and provided they simultaneously apply for tender forms and return them duly completed as quickly as possible on the basis of advance quotations already submitted.

A copy of the tender form can be examined at the India Store Department, 32-44, Edgware Road, London, W.2 on application to the "CDN" Branch. The drawings can be seen at the offices of Hodges, Bennett & Company, 59-60, Petty France, London S.W.1, from whom copies may be obtained at a fixed price per sheet.

The Director General of Supplies & Disposals, New Delhi, is inviting tenders for the following:—

- 75 axleboxes C.S. 9 in.  $\times$  4½ in. journal
- 200 axleboxes 10 in.  $\times$  5 in. with modified liners manufactured to IRS part Drawing No. W/570 alt. 3 with groove liner welded to Drawing No. A-129 alt. Ni (DGI & S No. 4599)
- 465 axlebox key plates
- 2040 axleboxes C.S. 10 in.  $\times$  5 in. journal
- 115 axleboxes 7 in.  $\times$  3½ in. journal (BB)

Tenders, quoting reference SRI/16609/

E/1, will be received up to 10 a.m. on August 27.

Forms of tender are available for purchase in India only from the Deputy Director General (Supplies), Directorate General of Supplies & Disposals, New Delhi; Director of Supplies & Disposals, Bombay or Calcutta; or Deputy Director of Supplies & Disposals, Madras.

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The Special Register Information Service, Export Services Branch, Board of Trade, reports that the Iraqi State Railways are calling for tenders for the supply of:—

Hardwood bridge timbers suitable for the hot, dry climate of Iraq:  
1,000 8 ft.  $\times$  8 in.  $\times$  8 in.  
800 8 ft.  $\times$  8 in.  $\times$  6 in.

The closing date for receipt of tenders is September 7. Tenders in a sealed cover marked "Tender for Hardwood Bridge Timbers," should be submitted to the Director-General, Iraqi State Railways, Baghdad, from whose office specifications and conditions of tender may be obtained.

A copy of the tender documents, including specifications and conditions of contract, is available for loan to United Kingdom firms in order of application to the Branch (Lacon House, Theobalds Road, London, W.C.1).

The Special Register Information Service, Export Services Branch, Board of Trade, reports that the Iraqi State Railways are calling for tenders for the supply of:—

Hardwood sleepers for metre gauge suitable for the hot dry Iraq climate:

- 150,000 size 6 ft.  $\times$  8 in.  $\times$  4½ in.
- Hardwood crossing sleepers for metre gauge suitable for the hot dry Iraq climate:
- 800 size 7 ft.  $\times$  8 in.  $\times$  4½ in.
- 800 8 ft.  $\times$  8 in.  $\times$  4½ in.
- 500 size 9 ft.  $\times$  8 in.  $\times$  4½ in.
- 400 size 10 ft.  $\times$  8 in.  $\times$  4½ in.
- 300 size 11 ft.  $\times$  8 in.  $\times$  4½ in.
- 300 size 12 ft.  $\times$  8 in.  $\times$  4½ in.

The closing date for the receipt of tenders is August 31. They should be addressed in a sealed cover marked "Tender for Sleepers Hardwood" to the Director-General, Iraqi State Railways, Baghdad.

United Kingdom firms wishing to tender must do so through (a) a local agent registered in the Chamber of Commerce, Baghdad, (b) Foreign Companies who have no branches in Iraq.

Tenderers are required to remit a deposit equal to 7 per cent of the first thousand and 5 per cent of the remaining value. The deposit of the unsuccessful tenderers will be refunded. Tenders which

do not comply with this clause will not be considered.

A copy of the tender documents including specifications and conditions of contract, is available for loan from the Branch (Lacon House, Theobalds Road, W.C.1).

The Special Register Information Service, Export Services Branch, Board of Trade, reports that the Stores Department, South African Railways, is calling for tenders (Tender No. C.7659), for:—

305 sets speed indicator equipment in accordance with S.A. Specification No. C.332, comprising the following:—

- One only A.C. generator complete
- One only wheel diameter adjustment assembly
- One only indicator
- One only frame socket
- Flexible armoured cable and flexible conduit

Ditto, but with axlebox cover, drive plate and crank pin to suit axleboxes shown on Drawings Nos. S.13/4/9180 (100 sets only), S.21/2/9180 (82 sets only) and S.42/9180 (123 sets only); total 305

One generator magnetising unit, in accordance with Clause 11.0 of S.A. Specification No. C.332

The closing date for the receipt of tenders is September 9. Tenders should be enclosed in sealed envelopes endorsed "Tender No. C.7659: For Speed Indicators" and addressed to the Chairman of the Tender Board, P.O. Box 7784, Johannesburg.

A copy of the tender documents, including specifications and conditions of contract but not including drawings, may be obtained on loan by United Kingdom firms on application to the Branch (Lacon House, Theobalds Road, London, W.C.1).

The Special Register Information Service, Export Services Branch, Board of Trade, reports that the Government of Pakistan, Ministry of Communications (Railway Division) are calling for tenders (Tender No. PRS-54 (WAG/9)) for the supply of:—

12 metre gauge motor vans, 4-wheel, "EVK" type, complete in all respects fully erected with body parts, underframes, wheels and axles, axle boxes, vacuum and side hand brake fittings, draw and buffing gear

19 metre gauge fish vans, 4-wheel, "EVE" type, complete in all respects fully erected with body parts, underframes, wheels and axles, axle boxes, vacuum and side hand brake fittings, draw and buffing gear, for the Eastern Bengal Railway

The closing date for the receipt of tenders is September 29, and they should be sent in sealed covers endorsed "Tenders for M.G. Motor Vans and Fish Vans" to the Director General (Railways), Railways Division, Ministry of Communications, Room No. 302, 2nd Floor, Multi-Storeyed Building, Adj. Assembly Building, Kings Way, Karachi.

Tender documents including instructions to tenderers, tender form, schedule of requirements, general and particular specifications, conditions of contract and contract drawings, can be obtained from the Office of the Director General (Railways), Railway Division, Ministry of Communications, Room No. 342, 2nd Floor, Multi-Storeyed Building, Adj. Assembly Building, Kings Way, Karachi, on payment of Rs. 50 per set.

A set of the tender documents is available for loan from the Branch (Lacon House, Theobalds Road, W.C.1).



## Notes and News

**Vacancy for Diesel Electric Supervisor.**—A diesel electric supervisor is required by the Nigerian Railway for one tour of 18-24 months in the first instance. See Official Notices on page 224.

**Senior Draughtsmen Required.**—Applications are invited by a Glasgow firm for senior draughtsmen with diesel electric and mechanical locomotive experience. See Official Notices on page 224.

**Permanent Way Engineer Required by Crown Agents.**—The Crown Agents for Oversea Governments & Administrations invite applications for the post of Assistant Engineer (Permanent Way) at the London Office. See Official Notices on page 224.

**Vacancies for Signal Staff on the Nigerian Railway.**—Vacancies exist on the Nigerian Railway for a signal telegraph inspector and signal telegraph assistant (capital works). Both posts are temporary for one tour of 12 to 24 months in the first instance, with prospect of permanency. See Official Notices on page 224.

**Vacancies for Designers.**—Applications are invited for the posts of designers required by a firm in the Birmingham area. Preference will be given to applicants with experience in cars, commercial vehicles and railway rolling stock, but good general engineering experience acceptable. See Official Notices on page 224.

**Works Manager Required.**—Applications are invited for the post of works manager required for rolling stock builders abroad. Previous experience in the manufacture of steel railway vehicles is desirable, although not essential, but applicants should have previously held a managerial appointment. See Official Notices on page 224.

**Bulky Load from Scotland to Paris by the Harwich-Zeebrugge Ferry.**—The first of two large boiler drums was despatched by rail on August 2 from Renfrew, near Glasgow, en route to Paris via the Harwich-Zeebrugge train ferry. The boilers are being constructed in the works of Babcock & Wilcox Limited, and are for use in the Porcheville electric power station, Paris. The boiler, weighing 85½ tons, 45 ft. long and 6 ft. dia., was loaded at the firm's private siding on a 16-wheel rail wagon of 100 tons capacity. The wagon had been fitted specially with Westinghouse automatic brake apparatus so that the through

journey to Paris might be completed over the Belgian and French National Railways without transhipment.

**Old Railway Uniforms Wanted.**—Mr. John Scholes, Curator of Historical Relics, British Transport Commission, Clive House, Petty France, S.W.1, is anxious to collect a few railway uniforms of exceptional or historical interest. The current issue of the *British Railways Magazine* points out that uniforms have always had a place of dignity in the railway world and there are sure to be more interesting specimens hiding in depots, some possibly associated with well-known railway characters of the past. Mr. Scholes would like to obtain, in addition, one or two silk hats, even if old and battered, as well as specimens of pre-amalgamation railway uniforms and caps. He looks forward keenly to hearing from anyone who can help.

**Shots at Snake in Train.**—Four young men, who brought a snake into a railway compartment and took shots at it with an air pistol, were each fined £2 and 8s. expenses recently at Edinburgh Sheriff Court. They admitted behaving in a disorderly manner on the 5.14 p.m. Edinburgh to Leeds train on April 4. On behalf of the British Transport Commission, a statement was read from a civil servant who had boarded the train at Waverley. The witness said that three student nurses who were in the same compartment as the accused and himself were considerably frightened by the men's behaviour, and had to leave the train at Dunbar. After flinging the snake's body from the carriage window the men then took shots with the pistol at objects on the railway line.

**A New Pressure Steam Cleaner.**—A new type of pressure steam cleaner, from which it is stated sealing-up has been almost entirely eliminated, has been introduced by Wickham Industrial Equipment Limited, a subsidiary of D. Wickham & Co. Ltd., Ware, Herts. An electrically-driven centrifugal pump gives a basic cold water pressure of up to 150 lb./sq. in., and ensures a full working pressure to either one or two jets with lengths of steam hose up to 120 ft. each gun if required. One of its features is the rotary cup burner which will burn either diesel oil or paraffin, adjustable to any temperature up to 165° C., fuel consumption is approximately 1.5 gal./hr. for maximum performance. Other mobile models include a light-duty machine designed to burn waste oil, and a steam assisted machine which uses surplus steam

from a workshop line. Electrical fittings are standard, and an operating panel is provided.

**London Midland Region Athletic Meeting.**—The London Midland Region of British Railways is to hold its first Annual Championship Meeting at Headstone Lane on August 21. There are 27 events to be decided.

**South African Rates Increase.**—The South African Minister of Transport has turned down a request by the Federated Chamber of Industries that the introduction of new railway rates be postponed for a further period beyond September 1. The new rates were the subject of an editorial note in our July 23 issue.

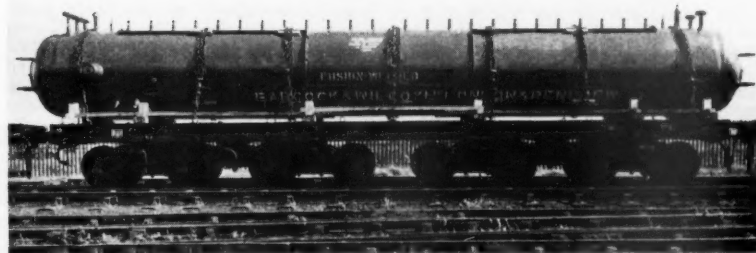
**Quick Check Oil Dispensers.**—Two C. C. Wakefield & Co. Ltd. Quick Check oil dispensers have been installed at the petrol filling point of the British Railways road motor depot at St. Pancras. The dispenser, which is also installed at the L.M.R. Brompton & Fulham road depot, has a rotary head, by which means lubricating oil can be measured and served as accurately and as easily as petrol. The equipment will be exhibited at both the Commercial Vehicle Exhibition and the Motor Show, which will be held at Earls Court, London, S.W., on September 24–October 2, and October 20–30, respectively.

**Retired Southern Region Staff in Local Government.**—Mr. C. P. Hopkins, Chief Regional Manager, Southern Region, recently gave a lunch at the Charing Cross Hotel, London, to two retired members of the staff who have been elected to public office: Mr. A. C. Billett, formerly driver at Weymouth Motive Power Depot, who has been elected Mayor of Weymouth, and Mr. C. F. Rogers, formerly Chief Commercial Clerk, Orpington, now Deputy Mayor of Islington. Also present were:—

Mr. F. J. Wymer, Assistant Chief Regional Officer; Mr. W. H. F. Mepsted, Commercial Superintendent; Mr. T. E. Chrimes, Motive Power Superintendent; and Mr. H. C. Lang, Regional Staff Officer.

**Cross-Channel Helicopter Freight Services.**—The Ministry of Transport & Civil Aviation has notified Silver City Airways that, subject to certain conditions, the Minister is prepared to approve, for a 10-year period, an application to use helicopters on cross-Channel air ferry routes. The company proposes to commence freight services on April 1 next with the Westland-Sikorsky S51 single-engined helicopter. When twin-engined types are available they will be used for passengers, and it is hoped eventually to replace the present fixed-wing aircraft used by large helicopters capable of carrying three cars and 12 passengers. The Fairey Rotodyne has been mentioned as a possible machine. This would be able to carry some 11,000 lb. within a cargo space of 3,300 cu. ft., and is expected to be available for flight trials early in 1956.

**West Cumberland Rail Tour.**—The Stephenson Locomotive Society (North Western Area), and the Manchester Locomotive Society are co-operating again in the arrangement of a tour by special train. This will be the second this year and the ninth since these tours have been jointly promoted, with the full co-operation of the Commercial and Operating Officers of British Railways. This tour, called "The West Cumberland Rail Tour," will take place on Sunday, September 5, and start



Boiler drum constructed by Babcock & Wilcox Limited, awaiting movement by rail from Renfrew to Paris

from Sellafield, at 1.20 p.m. Special connections have been arranged from London, Carlisle, Workington, Whitehaven, Manchester and other centres in the North to enable participants to make the tour in one day. Details can be obtained from Mr. H. D. Bowtell, 29, Langdale Road, Victoria Park, Manchester, 14.

**Opening of "The Model Engineer" Exhibition.**—The opening ceremony of "The Model Engineer" Exhibition took place at the New Horticultural Hall, Westminster, on August 18. The ceremony was performed by H.R.H. Prince Bernhard of the Netherlands, who previously had made a tour of the exhibition. Prince Bernhard was introduced by Mr. Kenneth E. Garcke, Chairman of Percival Marshall & Co. Ltd.

**Collapse of Bridge at Guildford.**—On the morning of August 14 a footbridge over the Waterloo-Portsmouth line of the Southern Region, about  $\frac{1}{2}$  mile south of Guildford Station, collapsed. It had been scheduled for demolition. No mishap to a train resulted, but traffic was disrupted for some hours. Through express trains were diverted via Horsham and local trains terminated at Guildford, Farncombe, Shalford and Bramley.

**London Midland Region Carriage Servicewomen.**—The fiftieth travelling Carriage Servicewoman has been appointed by the London Midland Region of British Railways. She will work round in rotation with two other servicewomen also allocated to Crewe. It will be her duty to join mainline trains at Crewe and travel as far as Carnforth to the north and Bletchley to the south, and clean the carriages as she goes. Her duties include cleaning floors, lavatories and fittings, removing litter, dusting window ledges, testing taps, brushing seats and armrests in unoccupied compartments, and replacing defective and missing lamps. The new servicewoman, who will cover 1,000 miles a week, wears a smart

uniform and carries a canvas holdall containing all cleaning equipment, including two canvas buckets.

**Victoria-Minas Railway, Brazil.**—The number of diesel electric locomotives supplied by General Motors in 1953 was nine, out of 11 on order, of 1,125 h.p. (traction) or 1,250 h.p., and not as stated on page 163 of our August 6 issue.

**Improved Connection with Holyhead-Dun Laoghaire Service.**—British Railways, London Midland Region, are to re-time the 5.20 p.m. express from Euston to Holyhead, for Dun Laoghaire, beginning with the winter service on September 20. Leaving at 5.35 p.m., it will be named the "Emerald Isle"; there will be a saving of 16 min. in the journey time to Holyhead. In the reverse direction the train will leave Holyhead at 7.30 a.m.

**Trico-Folberth Exhibits at Earls Court.**—A comprehensive range of equipment for commercial vehicles, railcars, road passenger transport vehicles, and locomotives will be exhibited at the forthcoming Commercial Vehicle Exhibition and the Motor Show at Earls Court, London, S.W. by Trico-Folberth Limited. The equipment will include PSV flashing light signal with motor driven flasher unit, and finger-tip control with warning light, designed to provide an illumination area of 12 sq. in. Also exhibited will be single and twin-note air-pressure horns of a powerful range not normally used in this country, in which case a similar equipment is available with smaller dia. air lines which restrict the volume of sound. A complete range of heavy-duty windscreens wiper equipments, pressure, vacuum, and electric, will also be exhibited.

**Diesel-Engine Driven Welding Sets.**—A new range of diesel-engine driven arc welding sets, incorporating the Fordson diesel engine, has been introduced by the Quasi-

Arc Co. Ltd. The engine is fitted with electric starting, has a speed of 1,500 r.p.m. and is 34 b.h.p. A feature of the design is the newly developed type of two-wheel undergear with over-run braking mechanism. Type DE300, current range 20-300 amps., incorporates a Quasi-Arc G300 generator with dual control of voltage and welding current, while the DE400, current range 60-400 amp., has the Quasi-Arc GH400 generator, with concentric controls. The sets are housed in a streamlined casing with louvred sliding doors to give easy access to the equipment.

**Flood Damage to Indian Railways.**—Many miles of line of the North Eastern Railway of India are reported to have been damaged in recent floods in northern Bihar and Assam. The Eastern Bengal Railway of Pakistan also is stated to have suffered as the result of floods in the Brahmaputra delta. No details as yet are available.

**B.T.C. Purchase of Pullman Shares.**—The transfer to the British Transport Commission of the 900,000 "A" ordinary and the 600,000 "B" ordinary shares of the Pullman Car Co. Ltd. is stated to be almost complete. Reference to the offer by the Commission to purchase these shares and to its acceptance by the shareholders of the Pullman Car Co. Ltd. was made in our June 18 issue.

**Cheap London-Lancashire Overnight Tickets.**—Midweek overnight cheap tickets available for return within 17 days are to be introduced by the London Midland Region of British Railways to or from Euston and Lancashire towns, starting on August 24. The arrangement gives reductions of between 20s. and 30s. on the present third class return fare. To or from Bury, Bolton, Liverpool, Manchester, Oldham, Rochdale, Stockport, Warrington, and Wigan the return fare will be 37s. 6d.; to or from Accrington, Blackburn, Burnley, Preston, and Southport 40s.; to or from Blackpool, Morecambe, and Lancaster 42s. 6d.; to or from Barrow 47s. 6d.; to or from Whitehaven and Workington 60s.

**Disposal of Transport Units.**—The British Transport Commission has issued a further list of transport units for disposal. This is Special List No. S.2, containing particulars of many special purpose and articulated vehicles, including the whole of the meat section of British Road Services, the majority of the meat vehicles being offered as a single unit with 498 vehicles and 394 trailers. Tenders for units in this list must be received by the B.T.C. by 10 a.m. on October 6, or, if land and buildings are included in the unit, by 10 a.m. on October 13.

**Specialloid Limited Results.**—The trading profit of Specialloid Limited for the year ended April 3 last was £31,756, compared with £59,680 for the previous year. After deduction of depreciation, debenture interest, and so on, totalling £35,779 (£42,781), and adding profits on assets and so on totalling £2,854 (£7,490, including E.P.L. relief of £3,250), there was a net loss of £1,169 (£24,389 profit). Trading credits relating to previous years were £5,436 (nil), and £6,733 was transferred from E.P.T. postwar refund account (transfer from benevolent fund £7,500 and from capital redemption reserve £631). The debit carried forward is £36,334 (£47,334 after writing £4,099 off patents).

### Runabout Tickets in East Yorkshire



Display at Scarborough Corporation Information Centre advertising holiday runabout tickets issued by the North Eastern Region for travel within the area

## Railway Stock Market

Stock markets, after their big rise in the past two months, turned a little easier at the beginning of the week when sentiment was affected to some extent by news of higher wage demands by the railway and engineering unions.

The latest developments in international affairs also seemed to make for caution, and news of big new issues was another factor tending to check the market rise. The modest setback was regarded in the City as inevitable, in view of the big advance in share values, because sooner or later, a tendency to take profits was bound to develop. In fact, however, selling has not been very marked. The rather low prices were due mainly to a slowing down of demand, and dealers still complain that there is shortage of stock in the market. Later, the somewhat lower prices brought in renewed buying.

Foreign rails again received only moderate attention, though dominion and colonial railway stocks were inclined to attract buyers. Canadian Pacific reflected New York buying, and strengthened to \$47½, while the 4 per cent preference stock was firm at £68½ with the 4 per cent debentures £91½. The Duke of Edinburgh's visit has tended to draw increased attention to the big developments taking place in Canada: the increasing industrialisation of the Dominion is, of course, regarded as a bull point for the railways.

White Pass no-par value shares came in for profit taking after their recent sharp rise, and receded to \$32½, while the convertible debentures were £115 and the 5½ per cent loan stock changed hands down to £28½.

There were buyers up to 27 for Midland of Western Australia stock; the 4 per cent, second debentures transferred at 42. Nyasaland Railways £1 shares again attracted buyers and changed hands between 5s. 4½d. and 5s. 9d.

Among Indian stocks, Barsi marked 103 and West of India Portuguese 5 per cent debentures have been dealt in around 90½.

There were fractional movements in Antofagasta stocks, which after easing, tended to firm up. The ordinary was 8½ and the preference 42. Dorada at 80 reflected a little selling. Business around 28½ was recorded in Chilean Northern 5 per cent debentures. Costa Rica ordinary stock marked 8.

United Havana second income stock held steady at 37 with the consolidated stock 5½. Elsewhere, Peruvian Corporation debentures eased to 57½, the preference stock to 8½ and the ordinary to 3½.

Recognition that shares of road transport companies have so far not participated to any extent in the upward trend of markets in recent months brought in buyers for a number of well-known shares in this section, but buyers found they were in short supply. As a result prices were marked up sharply in some cases. Maidstone & District changed hands up to 23s. 10½d., B.E.T. Omnibus up to 33s. 6d., Devon General at 32s. 6d., East Kent at 25s. 6d. and West Riding gained 6d. at 33s. 9d. Southdown were 32s. and Lancashire Transport 60s. B.E.T. 5s. "A" deferred units have been firm at 61s.

Engineering shares became less active, and failed to keep best levels, but showed gains on balance. Vickers were particularly good on the big dollar order for Viscount aircraft, and at 40s. have lost only a few pence of their rise. There is continued talk in the market that sooner

or later Vickers will have to raise more money by a new issue, bearing in mind the big expenditure on the aircraft and other sections of the business and the fact that financial resources have been reduced by the reacquisition of English Steel. Babcock & Wilcox eased to 61s. 4½d. and Guest Keen at 63s. 6d. lost part of an earlier good rise. T. W. Ward were 52s. and Tube Investments firm at 69s. 6d.

Hurst Nelson remained at 42s. among shares of locomotive builders and engineers. North British Locomotive eased to 15s. 9d., and Birmingham Carriage were 27s. 4½d. Charles Roberts 5s. shares were firmer at 10s. 1½d. Beyer Peacock have been firm at 42s. on the view that there are reasonable prospects of the 16 per cent dividend being maintained and the assumption that when more capital is required it is likely to be raised by an offer to shareholders on favourable terms. Vulcan Foundry were 28s., Gloucester Wagon 10s. shares 19s. 9d. and Wagon Repairs 5s. shares 13s. 3d.

## OFFICIAL NOTICES

*The engagement of persons answering Situations Vacant advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employer, is exempted from the provisions of the Notification of Vacancies Order, 1952.*

**NORTH BRITISH LOCOMOTIVE CO. LTD.**  
Glasgow, require the services of senior draughtsmen with diesel electric and mechanical locomotive experience. Alternatively men with sound mechanical experience would be considered. Apply in writing to the Diesel Traction Chief, stating full experience, age and qualifications.

**DESIGNERS.** Excellent opportunity for first class men. Preference given to applicants with experience in Cars, Commercial Vehicles and Railway Rolling Stock but good general engineering experience acceptable. Essential to have University degree of equivalent engineering qualifications. Four figure salary, modern offices, staff pension scheme, Birmingham area. Applications to Personnel Manager, Box 323, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

**WORKS MANAGER** required for Rolling Stock Builders abroad. Previous experience in the manufacture of Steel Railway Vehicles is desirable, although not essential, but applicants should have previously held a managerial appointment. Commencing Salary up to an equivalent of £188 Monthly, but according to qualifications. Provident Fund, free quarters, car, medical attention and passages for family. Apply, in writing, only stating age and whether married and giving full details of experience and technical education to Box 322, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

**DIESEL ELECTRIC SUPERVISOR** required by the NIGERIA RAILWAY for one tour of 15/24 months in the first instance. Appointment either (a) on contract terms with salary scale (including expatriation pay) £1,170 rising to £1,453 a year plus gratuity at rate of £150 a year or (b) with prospect of permanency with a salary scale (including expatriation pay) £1,085 rising to £1,315 a year. Outfit allowance up to £60. Free passages for Officer and wife. Assistance towards cost of children's passages or grant up to £150 annually for maintenance in United Kingdom. Liberal leave on full salary. Candidates should have served an apprenticeship with a manufacturer of electric traction equipment or with an electric traction Department of a Railway and have had, at least seven years' subsequent workshop experience in the overhaul and operation of traction equipment. Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2C/30564/RA.

**ASSISTANT ENGINEER (PERMANENT WAY)** required for their London Office, by the CROWN AGENTS FOR OVERSEA GOVERNMENTS AND ADMINISTRATIONS. Basic Salary scale £650×£225 to £750×£30 to £960×£40 to £1,000 plus Extra Duty Allowance of approximately 8 per cent. The £650 minimum is linked to entry at age 25 and is subject to increase at the rate of one

increment for each year above that age up to 34. Fully qualified officers at least 27 years old may be eligible for a special increase of £75 after two years' service. Engagement on unestablished terms with prospect of appointment to the established staff and of promotion. Candidates should have passed the Associate Membership Examination of the Institution of Civil Engineers, or of the Institution of Mechanical Engineers, or should hold an equivalent exempting degree. They must have served in the Permanent Way Department of a Railway or with a firm manufacturing switch and crossing equipment, and must be good draughtsmen. They should have a detailed knowledge of such equipment and be capable of designing of station layouts and of making calculations necessary for any type of turnout. A basic knowledge of railway signalling will also be an advantage. Write to the Crown Agents, 4, Millbank, London, S.W.1, state age, name in block letters, full qualifications and experience and quote M2A/40381/RA.

### NIGERIAN RAILWAY

**VACANCIES** exist for SIGNAL staff on the Nigeria Railway as under:—(i) **SIGNAL TELEGRAPH INSPECTOR (CAPITAL WORKS)** (M2C/30597/RA) Candidates preferably Associate Members of the Institution of Railway Signal Engineers or Graduates of the Institution of Electrical Engineers must possess a working knowledge and experience of installation and servicing of (a) G.E.C. Telephone Train Control Apparatus (b) The Railway Signal Company's Electric Train Staff Instruments (c) Mechanical Signalling apparatus particularly Double Wire apparatus. Salary Scale (including Expatriation Pay) £864 rising to £1,194. Gratuity at rate of £150 a year. (ii) **SIGNAL TELEGRAPH ASSISTANT (CAPITAL WORKS)** (M2C/30596/RA). Candidates preferably Members of the Institution of Railway Signal Engineers or A.M.I.E.E. must have sound experience and working knowledge of (a) G.E.C. Telephone Train Control equipment including line booster apparatus (b) The Railway Signal Company's Electric Train Staff Instruments including the electric interlocking with Starting Signal (c) the Westinghouse Double Wire Signalling apparatus. Salary scale (including Expatriation Pay) £1,434 rising to £1,560. Gratuity at rate of £150 a year. Both posts are temporary for one tour of 12/24 months in the first instance but there is a possibility of permanency. Outfit allowance £60. Free passages for officers and wives. Assistance towards cost of children's passages or grant up to £150 annually for maintenance in United Kingdom. Liberal leave on full salary. Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quoting reference number of post applied for.

**INTERNATIONAL RAILWAY ASSOCIATIONS.** Notes on the work of the various associations concerned with international traffic, principally on the European Continent. 2s. By post 2s. 2d. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

**BOUND VOLUMES.**—We can arrange for readers' copies to be bound in full cloth at a charge of 25s. per volume, post free. Send your copies to the SUBSCRIPTION DEPARTMENT, Tothill Press, Limited, 33, Tothill Street, London, S.W.1.

## Forthcoming Meetings

Until August 28 (Sat).—"The Model Engineer" Exhibition, at the New Horticultural Hall, London, S.W.1.

September 3 (Fri).—The Railway Club, at 57, Fetter Lane, London, E.C.4, at 7 p.m. Paper entitled "The Bexley Heath Railway," by Mr. E. A. Course.

September 6 (Mon.), to September 14 (Tue.)—Institute of Metals; Forty-sixth Annual Autumn Meeting in Switzerland.

September 7 (Tue.).—Permanent Way Institution, Leeds & Bradford Section, at British Railways Social and Recreational Club, Ellis Court, Leeds City North Station, at 7 p.m. Paper on "Permanent Way 'Mechanical Muscles' in use on British Railways," illustrated by lantern slides, by Mr. R. C. Mosedale, Senior Technical Assistant to District Engineer, Leeds, N.E.R.

Until September 25 (Sat).—"Popular Carriage" Exhibition (Two centuries of carriage design for road and rail) in the Shareholders' Meeting Room, Euston Station, London, N.W.1. Weekdays 10 a.m. to 7 p.m.; Sundays 2 to 7 p.m.